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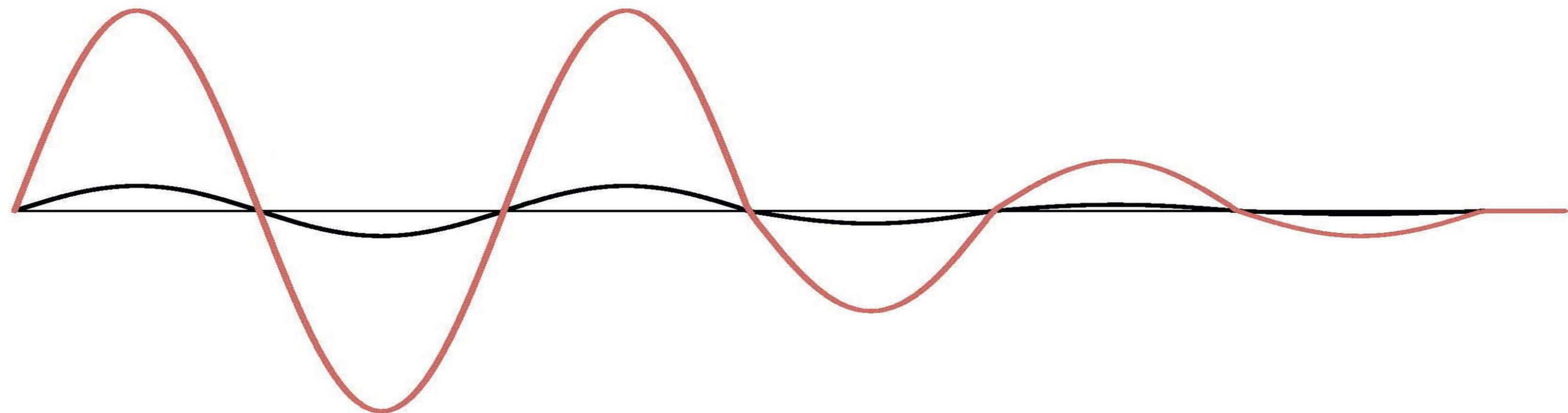
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VARIABILITY:
THE EFFECTS OF VARIATION IN
POWER RELATIONS WITHIN THE FIRM,
IN ITS MARKET PERFORMANCE, AND
IN THE EVALUATIONS OF ITS
PRODUCTS
FREDERIK B.I. SITUMEANG

Frederik B. I. Situmeang

Variability



VARIABILITY

**THE EFFECTS OF VARIATION IN POWER RELATIONS
WITHIN THE FIRM, IN ITS MARKET PERFORMANCE,
AND IN THE EVALUATIONS OF ITS PRODUCTS**

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VARIABILITY
THE EFFECTS OF VARIATION IN POWER RELATIONS WITHIN
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EVALUATIONS OF ITS PRODUCTS

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“Variability is the law of life, and as no two faces are the same, so no two bodies are alike, and no two individuals react alike and behave alike.”

— William Osler

1. Introduction

Variability is defined as the “...indication of how dispersed the probability distribution is about its center...[or] how spread out on the average are the values of the variable” (Rice, 2007: 130). Variability is a very important term in marketing and management research considering that the main purpose of analytical methods such as the analysis of covariance and correlations, the analysis of variance, and regressions is to provide evidence that the variability of a dependent variable can be significantly explained by a set of other (independent) variables (Rice, 2007). These methods are used as the basis to quantitatively confirm the hypotheses argued in business research, applicable in every facet of business decision making (Hair et al., 2006).

Although the main goal of the previously mentioned analyses is to find factors that can significantly explain the variability of a *dependent* variable, research in management strategy and marketing seems to overlook the potential use of variability as an alternative method to measure the *independent* variables. Several examples of the implementation of this measure method include the lack of consensus across consumer and expert evaluations, the trend of market performance, and the variability of organizational strategy across time, among others. Research that involves the effects of variability is more prominent in the financial literature, where the variability of a stock price is often used to predict its future performance (c.f. Das et al., 2005). Das and Chen (2007) brought their (2005) research into Management Science where, in the latter publication, they discuss how variability of opinions

among stockbrokers regarding a stock can negatively affect sentiment towards the stock which in turn affects its future price.

Apart from Das and Chen (2007), there are only few other studies in the marketing and management literature that examine the effects of variability. One example is Dacin and Smith's (1994) quantitative investigation of consumer behavior with regard to brand extensions. Their research includes a test that confirms a negative effect of varying quality across products within a brand on consumer evaluations of the extension of that brand. However, the first study picking up where Dacin and Smith (1994) left off was Volckner and Sattler's (2006) experimental research that synthesizes various studies about the determinants of product extensions. One significant determinant they find is variability of quality previously suggested by Dacin and Smith (1994). More recently, in Sun's (2012) research, the effects of variability rose in prominence in management and marketing research.

Another important example that gives explicit attention to the effect of variability is the qualitative research by Davis and Eisenhardt (2011). This work concerns the effects of rotating leadership on innovative performance. Davis and Eisenhardt (2011) argue that by varying the leadership, organizations are exposed to a wider perspective and richer knowledge which leads to better performance. In this thesis, their insights about the positive effects of changes in leadership leading to an increase in dynamic capabilities on innovative performance are applied to the study of the dynamics of power and influence across the marketing/R&D interface. Earlier studies on the characteristics of this interface and the consequences for innovative performance are focused on the degree of integration between the two sides of the interface (Griffin & Hauser, 1996; Hoopes & Postrel, 1999; Ittner & Larcker, 1997) or on which side has the greatest influence (Atuahene-gima et al., 2005). If the relative strength of the influence of one side seems to benefit innovative performance, any decline of such influence could be considered a threat (e.g. in the case of recent diminishing

marketing influence, see: Verhoef & Leeflang, 2009). However, this is not necessarily so, as seen from the perspective of Davis and Eisenhardt's (2011) research, which suggests that variability of the balance of power and influence within an organization can have beneficial effects on organizational performance, especially with regard to innovation.

All in all, the idea to use variability as an alternative way to measure a determinant is not new (c.f. Dacin & Smith, 1994; Das & Chen, 2007). However, as Sun (2012) and Davis and Eisenhardt (2011) point out, this method has been largely overlooked by the literature. Therefore, the core subject of this study is to explore and discuss how variability in consumer and expert evaluations and sales affects the performance of the organization in regard to sales and evaluations of future products, strategy in terms of the likelihood to explore new markets, and how the changes in Marketing-R&D orientation strategy affect performance. This discussion is presented in two parts: the first part will set forth the external aspect of organization in terms of market performance and evaluatory signals, while the second part analyzes organizational strategy (market exploration and Marketing/R&D orientation).

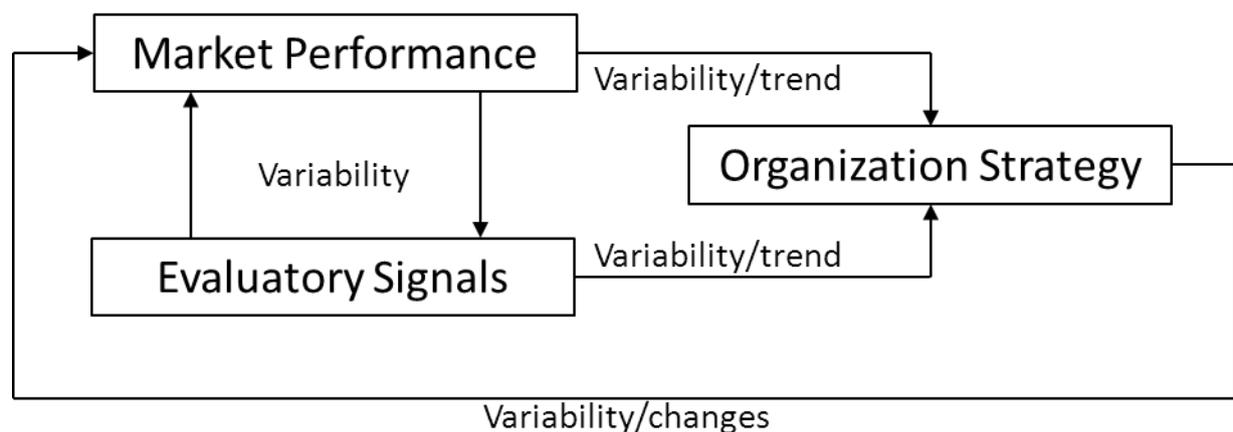


Figure 1.1 Visualization of the conceptual discussion

1.1. Main theoretical themes

Considering the outline of discussion previously described, it is acknowledged that evaluatory signals play a major role and is the first theme of this thesis, particularly how the

variability of evaluatory signals affects attitudes and behaviors of organization stakeholders. The signaling theory is heavily used for this theme. This theory posits that a party or agent *credibly* conveys some information about itself to the principal (Spence, 1973; Kirmani & Rao, 2000; Connelly et al., 2011). For example, in a job market situation discussed by Spence (1973), potential employees send a signal about their personal capability in performing certain tasks by acquiring relevant educational credentials or certifications. In a similar way, signaling is also an important aspect in marketing consumer products, where companies use signals such as expert critic evaluations to convince potential consumers to buy their products (Moon, Bergey, & Iacobucci, 2010). Expert critic is seen here as a credible third party professional evaluator whose main task is to write product evaluations (or reviews) for consumers. Deloitte's (2007) study found that 82% of consumers say that their purchase decisions have been directly influenced by reviews. Particularly in the creative industry where product qualities are difficult to ascertain before consumption (Caves, 2000), evaluatory signals help the consumer to set up expectations and identify product attributes before deciding to buy. It is not surprising that expert evaluations (Basuroy, Chatterjee, & Ravid, 2003; Boatwright, Basuroy, & Kamakura, 2007; Eliashberg & Shugan, 1997; Reddy, Swaminathan, & Motley 1998) can greatly influence product sales. In addition to expert critics, consumers are also able to submit product evaluations via online aggregators such as metacritic.com or imdb.com. Similar to expert evaluations, consumer evaluations also have a significant effect to market performance (Liu, 2006; Zhu & Zhang, 2010).

However, the prior studies largely disregarded that these evaluatory signals can vary and thus the majority of research merely focus on the average signal score, excluding variability as a pertinent factor (see Sun, 2012). However, recently, Sun (2012) demonstrates how the variability of evaluatory signals is an important attribute that can influence product sales. As pointed out by Sun (2012:696), "...prior research has focused on establishing the

causal impact of the average rating on sales, and little is known about how the rating distribution would matter.” This thesis answers Sun's call for more research on this topic. The term signal amplifier will be used when showing how the lack of consensus across signals of the same type moderates the link between the evaluations of past and future products.

The second theme of this thesis is the feedback effects of market performance (sales) on organization strategy and stakeholder attitudes. Past performance is often employed as a main indicator of future organization strategy (e.g. Audia & Greve, 2010; Lehman & Hahn, 2012) and the success of future product (e.g. Hennig-Thurau et al., 2009). The consensus in the literature is that when the market performance of a product or a brand is good, it will be very likely that the market performance of an entity that extends the product or the brand will also be good (Hennig-Thurau et al., 2009).

The analysis in the literature are focused towards examining the relationship between the performance of a product and the sequel, extension, or product upgrade that immediately come after the focal product. What is yet overlooked by the literature is the history of the whole brand/series performance and consequently, therefore, it misses out the opportunity to explore the impact of factors such as market performance fluctuations or trends to the organization. The discussion in this thesis shows how performance variability of an organization affects its future market performance, its product evaluations, and its strategy. In contrast to the prior studies (e.g. Hennig-Thurau et al., 2009), studies in the thesis examines a longer timeframe which will enable observation of the variability of performance and analyze any significant increase or decrease movement of market performance across time, as well as the implications to the organization.

The third theme of this thesis is that of the relative influence of Marketing and R&D departments in new product development. At present, the literature of marketing and product innovation management is focused on the level of influence (Atuahene-Gima & Evangelista,

2000; Verhoef & Leeflang, 2009) rather than on the continuous exchanges of influence (Davis & Eisenhardt, 2011). According to some, a more influential marketing department is generally beneficial because a marketing department's influence is related to a stronger marketing orientation (see also Homburg, Workman & Krohmer, 1999). On the other hand the advocates of R&D would argue that more R&D influence would benefit the technological sophistication of new products. As members of a technological community, R&D professionals have preferences towards technological achievements or scientific recognition (Dietz & Bozeman, 2005), which would in turn be good for the company to gain recognition as an industry leader and advance its portfolio of technological innovations.

Instead of debating which functional area should be more influential, this paper posits that the distribution of relative influence may change in certain directions as organizations evolve and environments change. For example, earlier it was noted that organizations explore a new sub-market when experiencing a decline or an uncertain performance (c.f. March, 1991) which indicates that a single strategy would not work in favor of the organizations all the time in all conditions. Along the same lines, Davis and Eisenhardt (2011) use the term 'rotating' leadership, which occurs when the leadership in a bilateral partnership is rotated between actors. Davis and Eisenhardt (2011) not only argue that stability in leadership is less productive than relationships that experience rotating influence, but also that consecutive changes, where one party becomes more dominant over time, are also less productive. Their insight is used to explore how variability of leadership in terms of continuous change of the level of influence across time can create a dynamic capability which significantly impacts New Product Performance.

1.2. An overview of the chapters

This thesis is a collection of four studies, all of which have been carried out in close collaboration with PhD co-supervisors Nachoem Wijnberg and Mark Leenders, while the

third study also involved former master thesis supervisor, Gerda Gemser. This thesis is structured as follows. In the first two chapters after the introduction, the focus is on consumers and experts and the role of variability of evaluatory signals on consumer and expert behaviors and attitudes. It then continues by focusing on the organization itself, determining the effect of performance and evaluatory signal variability to their market targeting strategy, and lastly, an exploration of how the variability of relative influence of Marketing and R&D can benefit organizations.

Chapter 2 focuses on the determinants of consumer behaviors in terms of sequel sales with respect to the themes of evaluator signal and performance feedback. In this research, signaling theory is used to elucidate how product evaluations are considered as signals that affect consumer-buying behavior. In so doing, the Hennig-Thurau, Houston, & Heitjans (2009) argument is adopted to set a basic expectation that the evaluations of the previous editions are positively related to the sales of the next edition, which is termed as “the forward carry over effect of evaluations”. Market performance of past products also plays a major role here and also determines future market performance. What is new here to the literature is the role of variability. Thus, the task is to theorize and to quantitatively investigate the moderating role of variability of product evaluations across past products to the forward carry over effect of evaluator signals, which will result in adopting the theory of reasoned action (Fishbein & Ajzen, 1975; Miller, 2005). This will position the variability of evaluations as a weighing factor that influence how evaluations of past editions are used by consumers. In addition to variability, other weighing factors are also explored, namely the market performance and the type of product consumption.

Chapter 3 focuses on product evaluations rather than sales. Again in this chapter, evaluator signal and performance feedback are the main topics of discussion. Signaling theory will be employed to show how past performance indicators can be used to predict

expert and consumer evaluations of sequels. The basic expectation would be the evaluations of the preceding editions will be positively related to the evaluations of the sequels, in both the context of consumer evaluations and expert evaluations. However, the variability of attitude across the evaluators reflects a lack of consensus about product quality. Therefore, this chapter will explore how the absence of consensus is damaging for future product evaluations. The absence of consensus also moderates the link between evaluation of past products and sequel evaluation. In addition, sales performance of the previous editions can also positively affect sequel evaluation and lack of consensus is shown to moderate this factor.

Chapter 4 explores how evaluator signals and market performance can be used to predict the probability of video games developers extending their operation to a new genre. Performance feedback is the main theme of this chapter. This study is based on March (1991) and Singh (1986) arguments on the impact of performance on organization risk taking behavior. However, different from other studies, the focus is on variability, in terms of trend and variance of sales and evaluatory signals. The framework is based on the Raisch and Birkinshaw (2008) model on organization explorative and exploitative behaviors. The model here is altered by using variability of performance and evaluator signals as the determinants of behavior rather than organizational antecedents. Following their model, competition is used as the moderating factor of the main determinants.

After discussing the impact of performance and evaluatory signals variability to organization strategies, an exploration of how changes of organizational strategy, in terms of the levels of marketing and R&D's relative influence affect new product performance is will be conducted. Chapter then explores how the changes of marketing and R&D's influence in NPD affect the performance of new product. This study fits to the relative influence theme. The main arguments in this part are heavily based on Davis and Eisenhardt's (2011) view on

rotating leadership, and will show how companies can suffer from integration trap if they disregard making changes in the relationships between marketing and R&D across time.

All in all, the relationships between the chapters in this thesis can be visualized on Figure 1.2.

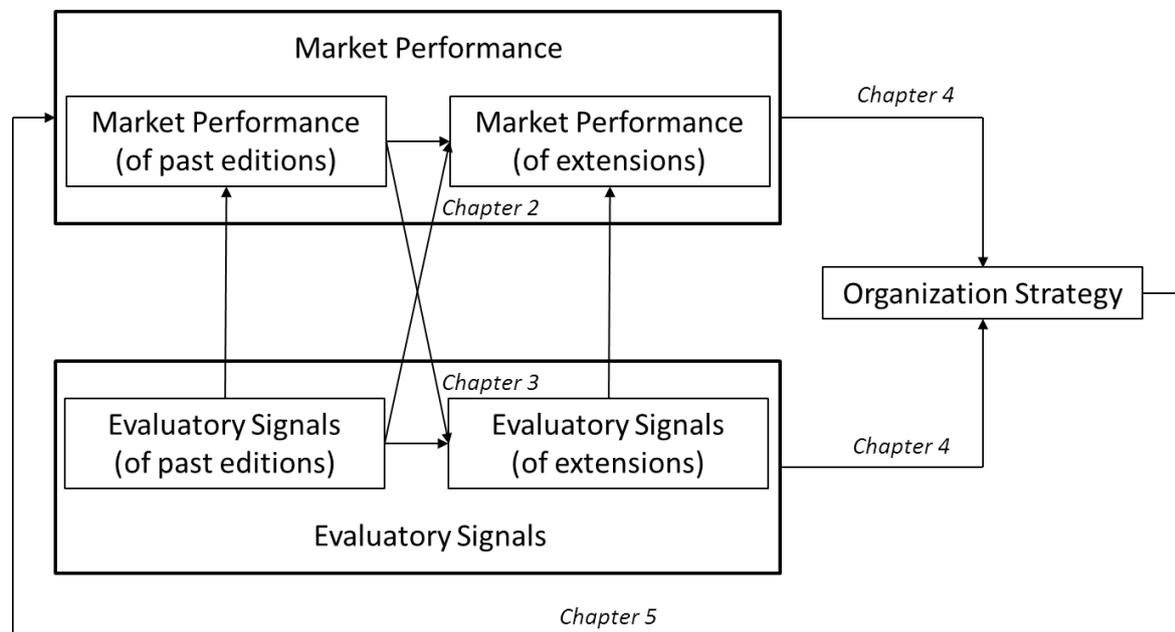


Figure 1.2 Visualization of the links between the chapters

1.3. Methodology

1.3.1. Industrial setting

The studies conducted in this thesis are based on two industries: the console video games industry (Chapters 1 through 4), and the pharmaceutical industry (Chapter 5). Although the main characteristics of these industries are of the creative and high tech industries, the conclusions derived from the research conducted for this thesis can be extended to different industries, such as the art industry or the automotive industry and others.

The decision to focus on the pharmaceutical industry in Chapter 5 is due to the fact that the structure of the video games industry does not allow observing differences of relative

influence within one company. In the video games industry, the R&D tasks are mainly conducted by video game developers who develop, exploit, and explore new technologies of video gaming production (Kerr, 2006). Activities traditionally performed by a marketing department are mainly conducted by video game publishers (Kerr, 2006). Therefore, in collecting the data on the relative influence from the video games industry, questionnaires would have to be sent to both video game developers and publishers, which would complicate the process and double the time spent for data collection. As video game developers can also have contracts with different publishers, the data gathering process is even more complicated, as tracking would be necessary. Different from the video games industry, pharmaceutical companies are active in both marketing and R&D activities, which eliminates the previously mentioned complications of using multiple sources and tracking. Nevertheless, the analysis results from the pharmaceutical industry can also be applied to the video games industry (or any other industry with similar traits) in a way that an interdepartmental relationship (marketing and R&D) is replaced by an inter-organizational (i.e. R&D company – marketing company) relationship.

1.3.2. Data gathering

In focusing on two industries, the data are gathered in two ways. Data about the video games industry are gathered via the web crawling method. During the research phase, the team employed a professional programmer to construct software that crawls for data from Metacritic.com. The data are comprised of product evaluation scores, user data (those who submit the evaluation), and the evaluation texts both for experts and consumers who are registered on the website. Following this, market performance data was also gathered from vgchartz.com which records sales data for all games in all platforms in three main markets, i.e. the USA, Europe, and Japan. As of today the software maintains more than 6,000 unique

records in the database which can be used in a broad range of research; a few of them are reported in this thesis.

The pharmaceutical industry data are based on secondary data that are also used in several other studies conducted by prof. Mark Leenders (c.f. Leenders & Wieringa, 2008; Gemser & Leenders, 2011). This database is based on ESOMAR pharmaceuticals industry data focusing on high revenue companies (above \$50 million).

1.3.3. Method of analysis

Studies in this thesis are all based on the quantitative research method. Multiple regression analysis and its derivatives are employed in these studies because they are the methods of choice to estimate the relationships between several factors and a dependent variable (Hair et al., 2007). Ordinary Least Square (OLS) tests are implemented to estimate the sales of video game sequels based on the sales performance of preceding product editions, consumer and expert evaluations, social consumption type, and the variability of evaluations. Next, path modeling analysis is employed to estimate the determinants of expert and consumer evaluations. Path modeling is used to estimate both constructs simultaneously. Similar to the previous model, sales performance of preceding product editions, consumer and expert evaluations, and the variability of evaluations are used as the determinants. Logit regression is used to estimate the probability of new market explorations because the output variable is a binary variable which cannot be easily tested using a regular regression (Hair et al., 2007). Lastly, the multiple regression method is employed again to estimate New Product Performance based on the changes in the level of influence of the marketing department and the R&D department during an NPD process.

“Transformers 2 boring?! Robot lasers are never boring! Megan Fox in slow motion is never boring! It needs to be seen and talked about with friends.” (Angry Joe, 2009)

2. The good, the bad and the variable: How evaluations of past editions influence the success of sequels¹

Abstract

The purpose of this paper is to contribute to the marketing literature and practice by examining the relationship between evaluations of previous editions and the sales performance of the sequel. A set of hypotheses was developed, based on the theory of reasoned action, and a dataset was obtained from aggregator sites to test the hypotheses by performing OLS estimation, while the two stage estimation method is followed to mitigate endogeneity. High variability of evaluation of past editions can decrease the strength of the relationships between evaluations of past editions and the success of sequels. The positive relationship between consumer evaluations of past editions and sales of the sequel is strengthened if there is a large community of users and if the product is consumed socially. This study pertains to the strategic marketing of sequentially released products; broader types of brand extensions are beyond the scope. Marketing managers can use data about the evaluations of earlier editions to assess the likelihood of success of a sequel. Likewise, managers should encourage more active interactions between consumers to improve sequel success. This paper provides a theoretical framework that helps to understand the carry over mechanism between earlier versions of a product and later versions or sequels. It illuminates the role evaluations of previous editions play in determining the success of the sequel and, for the first time, highlights the impact of variability of evaluations across the series as well as whether the product is consumed individually or socially.

Keywords: Sequels, Consumer Evaluation, Size of User Community, Variability of Evaluations, Socially Consumed Product

2.1. Introduction

Sequel series such as James Bond or the Harry Potter books have become huge successes and have created communities of loyal followers. Most of the best-selling products in the video games industry, in publishing, and in the movie industry are sequels. For example, the latest sequel in the Call of Duty video game series sold a record of 6.5 million copies and amassed more than US\$400 million of revenue on the first day alone (data from www.vgchartz.com).

¹ This chapter has been accepted for publication in the European Journal of Marketing

Considering the significance of the sequel strategy for many industries and the creative industries in particular, it is critical to understand the factors that explain sequel success better.

In the marketing literature, sequels and their success are rarely the key focus of study; rather the fact that a product is a sequel is treated as a control in analyses of the impact of other factors (see for example, Ho et al., 2009; Karniouchina, 2011; Sunde and Brodie, 1993). This stream of literature generally shows that sequels perform better in the marketplace. The reasoning is that the original product must have created a positive image and this image is carried over to the sequel, making the sequel more attractive and also creating awareness, excitement and anticipation, which will help subsequent sales (Ho et al., 2009; Karniouchina, 2011; Keller, 2003; Moon et al., 2010; Sood and Dreze, 2006; Sunde and Brodie, 1993).

In this study, we theorize and test whether and how success is carried over from past editions to the new sequel by studying publicly available product evaluations from the present sequel and its previous editions. Before making a decision to buy any product, consumers often look for signals to assess the properties and qualities of the product. The signals that are taken into account when evaluating a product may be important cues from the product, such as observable product attributes and packaging, but also evaluations of the product by experts and other consumers. These evaluations are widely available and they may affect the level of success of new products (Eliashberg et al., 2006).

The phenomenon that the image of earlier products can color the way product extensions, or later editions in a series, are perceived is described as the 'carry over mechanism' (Hennig-Thurau et al., 2009; Sood and Dreze, 2006). With regard to sequels in a series covering multiple editions, the role of evaluations is potentially even more interesting as past evaluations of earlier editions may influence the success of the new sequel as well. This potential carry over mechanism does not necessarily mean that evaluations of previous

editions are comprehensively being consulted by consumers who consider new editions of the product. Evaluations of previous editions may have had an effect on the constitution of this image or merely reflected it, but in both cases these earlier evaluations can give information about what could be carried over.

While the existence of the carry over mechanism between earlier editions and a sequel is highlighted in studies before, there has been little in-depth attention as to how exactly this would operate or what factors affect this carry over mechanism. In addition, we argue that evaluations in a longer series of products provide an interesting arena to study the carry over mechanism as the carry over effect may stretch to multiple editions and is not straightforward for every sequel.

The general theoretical foundation to explore the relationships between past evaluations in a series of products and the success of sequels is provided by the theory of reasoned action (Fishbein and Ajzen, 1975; Miller, 2005). In this theoretical framework, a distinction is made between individual attitudes and subjective norms as co-determinants of eventual behavioral intentions. Individual attitudes reflect how favorable an individual is towards the product and subjective norms are the opinions of the community in the person’s environment. More importantly, Fishbein and Ajzen (1975) propose that individual attitudes and subjective norms can receive different weights in the formation of a person’s behavioral intentions.

Here, we do not focus on individuals and their decision to buy the new sequel but explore how evaluations by experts and consumers of past editions (signals of favorable or unfavorable qualities regarding previous products in the series) are associated with the decision making of consumers at large regarding the purchase decision of the sequel. The introduction of weighting factors allows for explaining why past evaluations may not play the same role across all sequels and communities and that there are factors that may cause

evaluation inputs to have more or less weight in the eventual sequel buying decision. This can provide new insights regarding the carry over mechanism.

A key weighting factor in this study is variability of past product evaluations in the series . Since an evaluation is a measure of quality appreciation as given by expert critics or by consumers, variability of evaluations signals a specific form of uncertainty (volatility) regarding the extent to which the quality evaluations have been consistent across editions. Variability across editions, as a result, provides additional information on the predictability of the qualities of the series and can potentially function as a (collective) weighting factor on how quality judgments of earlier editions affect the intention to buy the new sequel in the series. Other weighting factors may play a role as well such as the size of the user community and the degree of social interaction during product consumption.

The following sections discuss the theoretical framework leading up to the hypotheses. Then, the methodology and the data are described. The findings are presented in the results section followed by a series of robustness tests. Finally the implications of the findings for marketing are described as well as the limitations and possible avenues for future research.

2.2. Theoretical framework and hypotheses

2.2.1. Theory of reasoned action

The theory of reasoned action (Fishbein and Ajzen, 1975), and successor theories such as the theory of planned behavior (Ajzen, 1991), present an influential paradigm in social psychology and marketing (Bang et al., 2000). Its purpose is to present a coherent theoretical framework for the study of the formation of behavioral intentions. Here, we employ two core insights from the theory of reasoned action: First, we apply the notion of

individual attitudes and, more importantly in our study, subjective norms as determinants of behavioral intentions. Second, we consider factors that may have an impact on how these determinants are weighted and ultimately affect the market success of the focal product. Individual attitudes relate to what the individual beliefs about a particular action (e.g. buying a new sequel), as if this individual were a Robinson Crusoe, weighing up the available information in the light of his own feelings about the credibility of the information, the likelihood of particular outcomes and their importance to her/him. In contrast, subjective norms represent the beliefs of others, especially members of the focal individual's peer group. The normal - non-Robinson Crusoe - individual will take both individual attitudes and subjective norms into account to arrive at the eventual behavioral intention.

Past evaluations of consumers and past evaluations of experts of the editions preceding the sequel are potential signals of quality that relate to the attitudes in the marketplace towards the series and the underlying sequel. Previous studies, for example, also conceptualized expert opinions as constituents of subjective norms (Miller, 2005). Here it is probably more accurate to consider both consumer evaluations and expert evaluations as subjective norms because they express the opinions of peers; other consumers and experts reviewers.

The key point that we take away from the theory of reasoned action is that weighting takes place in the formation of buying intentions. Given the level of analysis, we focus on factors that larger groups of (potential) consumers may take into account and they are derived from uncertainty theory and the information processing literature (Glazer and Weiss, 1993; Tellis, 1988): variability of the evaluations across editions, the size of the user community and whether the product is socially consumed or not. It should be clear that our study is not a straightforward application of the theory of reasoned action, but rather an attempt to use the general framework. Fortunately, the theory has been proven to be robust and applicable to a

broad range of settings (c.f. Sheppard et al., 1988). The individual him/herself remains a black box in our approach.

2.2.2. Expert evaluations and consumer evaluations as signals

Signaling theory (Spence, 1973) explains how decisions are being made if limited information is available by focusing on the availability of signals of quality to the decision maker. The lower the ability of the individual consumer to evaluate the product on offer, the more important the presence of signals that do not directly derive from the product or the producer will be. In the creative industry most goods are experience goods; one has to consume the product or experience to really know whether one likes it or not (Caves, 2000). Because of this, expert evaluations, such as reviews in newspapers or other media, can play an important role with respect to product performance, as has been found in many studies, especially with regard to the movie industry (Basuroy et al., 2003; Elberse and Eliashberg, 2003; Eliashberg and Shugan, 1997).

While expert reviews - historically delivered by print or broadcast media - have been available to guide purchasing decisions in many cultural industries for a long time, consumer reviews have only become generally available since the spread of Internet. Websites like Metacritic, IGN, Gamespot and online stores such as eBay and Amazon started gathering consumer reviews of their products and a few studies study the impact of consumer evaluations on sales. Liu (2006) finds that consumer evaluations affect sales positively. Liu (2006) argues that consumer evaluations of movies posted in a particular week affect the following week's sales because movie-goers often discuss their experiences and share their opinions with their friends. Zhu and Zhang (2010) provide similar evidence about the benefits of positive consumer evaluations for sales in video games and they suggest that niche or lower budget products could especially benefit from consumer reviews (see also Gemser et

al., 2007).

Sequels are brand extensions that studios use to capitalize on the success of an original product by producing another product that reprises the same characters evolving in a new situation (c.f. Sood and Dreze, 2006). Here, we take the perspective of the series and there are many sequels with three or more editions. So, the question arises whether and how past evaluations of earlier editions carry over to the latest sequel?

2.2.3. The impact of evaluations of past editions on sequel performance

Hennig-Thurau et al. (2009) show that positive evaluations of the preceding edition positively affect sequel sales. They argue that this could be explained by an image carry over effect. Theorizing and extending these ideas, one may argue that this carry-over effect from past evaluations could also result from the evaluations of all previous editions of the product. In addition, the theory of reasoned action would indicate that there are possible weighting factors at play, which we will discuss later.

Miller (2005) considers expert evaluations as an input for the formation of individual attitudes. To give one example, an individual attitude towards particular types of food can be affected by the opinion of his doctor and/or by articles about health-related matters written by experts. Similarly, the opinions of experts about previous editions could play a role in the formation of the attitudes vis-à-vis the sequel. The creative industries in general provide prime examples of markets where consumers can access the expert evaluations of catalogs of products, including past editions in a particular series. Lately, websites have become available that aggregate evaluations from expert critics as well as regular consumers around the world. As a result, one can expect that, if a new product belongs to a series that has received positive expert reviews in the past, these positive expert reviews may contribute to shaping the purchase intentions of consumers affecting sequel success positively, irrespective

of the evaluations of the sequel.

H1a: *Positive expert evaluations of past editions in the same series have a positive effect on the success of a sequel.*

A similar argument can be made with regard to consumer evaluations of past editions as they too can contribute to the formation of sequel buying intentions. However, in contrast to expert reviews, consumer evaluations of past editions are also a reflection of the degree to which users like the product (Liu, 2006), i.e. they directly signal consumer experiences and satisfaction with the products (Chen, Fey, and Wang, 2011). Satisfied consumers are more likely to trust and remain loyal to a brand, increasing the likelihood of future consumption (Chaudhuri and Holbrook, 2001; Selnes, 1993). The framework of the theory of reasoned action suggests that consumer evaluations of previous editions can reflect the attitudes and behaviors of consumers regarding previous editions and the series as a whole. These evaluations can therefore function as a subjective norm shaping behavioral intentions. So, positive consumer evaluations of past editions can affect behavioral intentions to buy the sequel, irrespective of the evaluations of the sequel.

H1b: *Positive consumer evaluations of past editions in the same series have a positive effect on the success of a sequel.*

2.2.4. The effect of variability of evaluations across a series of editions

Variability is defined as the frequency and magnitude of changes in the environment over time (Glazer and Weiss, 1993). Here, we conceptualize variability of expert evaluations across editions as a weighting factor for potential buyers of the new sequel. Consumers generally do not like uncertainty, especially regarding quality, opening the possibility that large groups of consumers weigh past evaluations lower in their purchase intention regarding

the next sequel.

One form of uncertainty that has received considerable attention in the literature is volatility. Volatility creates uncertainty because the qualities of the sequel are less predictable (March and Olsen 1975). If there is volatility in past evaluations, clearly the series qualities do not overpower the edition qualities, making consumers more careful about following the average evaluation in the series. Therefore, variability may be a negative weighting factor in the relationship between past evaluations and sequel sales.

Other research supports the notion of variability as a negative weighting factor. For example, Dacin and Smith (1994) conduct an experiment in which they expose their respondents to a product series with varying differences regarding product quality and find that, as the variability of quality between products within the same brand increases, consumer confidence in the extension of the same brand decreases. Similarly, Volckner and Sattler (2006) find that the effect of variability in quality is detrimental to brand performance. To explain the detrimental effect of variability, they argue that the strength of the brand is diluted by evaluation signals about non-stable quality, indicating increased consumer uncertainty (Dacin and Smith, 1994). Desai et al. (2008) further argue that consumers regard the information about variability of service quality to infer inferior firm quality and reliability.

Expert evaluations may signal a product’s quality to (potential) buyers (Eliashberg and Shugan, 1997). If such signals vary across editions in the series, one can argue that the reliability of expert evaluations - as quality signals – may be lower and uncertainty higher because consumers cannot get a clear signal whether the experts support or dislike the products and the series as a whole. Since we are interested in the performance of sequels at the market level, expert evaluation variability in the series could be an important (collective) weighting factor for consumers. The apparent lack of consistency of such a signal can effectively weaken the value of expert evaluations for the majority of consumers and reduce

its effect on sales.

H2a: *Variability of expert evaluations in a series moderates the effect of expert evaluations of past editions on sequel success. The effect of expert evaluations of past editions is less positive when there is a higher variability of expert evaluations.*

Again, the general argument about the effects of past expert evaluations can be applied to the effects of past consumer evaluations. Variability of consumer evaluations of past editions relates to uncertainty and may again decrease the extent to which consumers rely on them as signals of quality, shaping their individual purchase intentions, and thus have a negative effect on sequel sales in the marketplace. Moreover, a high degree of variability of consumer evaluations of products within the same series may be considered a negative quality signal in itself, because it suggests inconsistencies that consumers usually prefer to avoid (Das et al., 2005; Das and Chen, 2007). Consumer evaluations also function as a reflection of the overall satisfaction and loyalty of the community of consumers towards the series. When consumers in general like one edition much less than another, one can, at the very least, infer that these consumers are not blindly loyal to the brand.

Information processing theory states that if consumers are loyal to a brand or series, their response to exposure to signals such as past evaluations is likely to be higher (Tellis, 1988). Exposure, attention, comprehension, and retention of past evaluations are selective processes operating in favor of the products that consumers actually use. So, if there are consumers losing interest in the series, signaled by variability of evaluations across editions, this may make consumers less receptive for a positive carry over effect in the series. In addition, cognitive consistency theory (Calder, 1981) provides similar arguments as inconsistencies create tensions and thus motivate consumers to respond. If consumers decide to wait and see for example, given that new games enter the market constantly, this can lead

to considerable reductions in sales. Conceptualized as a negative weighting factor, this means that subjective norms originating from the community are given less weight in the formation of behavioral intentions for many consumers resulting in a weaker carry over effect and lower sales in the marketplace, irrespective of the evaluations of the sequel.

H2b: *Variability of consumer evaluations in a series moderates the effect of consumer evaluations of past editions on sequel success. The effect of consumer evaluations of past editions is less positive when there is a higher variability of consumer evaluations.*

2.2.5. The size of the user community

So far we discussed expert evaluations in tandem with consumer evaluations. A key difference between expert and consumer signals is, however, that consumers may actually buy, consume and socialize around the product and that there may be thousands of them posting reviews. Whereas variability of past consumer evaluations across the series may hint towards a lower level of loyalty among consumers, the size of the user community is a direct measure of the number of knowledgeable customers. Cognitive elaboration is known to be richer for products with which consumers have more extensive experience (Cacioppo and Petty, 1985). As a result, quality information signals are more likely to be received, processed and stored into memory (Tellis, 1988).

Brand communities relate to consumer loyalty (Marzocchi et al., 2013). By discussing preferred products and sharing actual experiences, community members also add to the enjoyment of the product. The contacts with other users increase the odds for receiving information about the product and learning how to become a more proficient user and finding practical assistance. The larger the community, the more information exchange is likely to take place both online and off line. So, although the community may affect each individual

consumer differently, an argument can be made that if the community that provides and communicates all the information is larger, the link between past evaluations and behavioral intentions may be stronger (see also Moon et al., 2010). Finally, in creative goods and in information markets in general, there are always positive or negative evaluation outliers that are averaged out against the true qualities and value of the product if markets are larger. So, a larger community could also lead to more trust in the average past evaluation in the series, leading to a stronger carry over effect.

Summarizing, we argue that the size of user community will operate as a weighting factor with regard to the relationship between past consumer evaluations and sequel sales, irrespective of the evaluations of the sequel.

H3: *The size of the user community moderates the effect of consumer evaluations of past editions on sequel success. The effect of consumer evaluations of past editions is more positive when there is a larger sized user community.*

2.2.6. Social interaction and consumption

We have discussed expert evaluations in tandem with consumer evaluations. A key difference between expert and consumer signals is, however, that consumers may actually buy, consume and socialize around the product and that there may be thousands of them posting reviews. Whereas variability of past consumer evaluations across the series may hint towards lower loyalty among consumers, the size of the user community is a direct measure of the number of knowledgeable customers. Cognitive elaboration is known to be richer for products with which consumers have more extensive experience (Cacioppo and Petty, 1985). As a result, quality information signals are more likely to be received, processed and stored into memory (Tellis, 1988).

Brand communities relate to consumer loyalty (Marzocchi et al., 2013). By discussing

preferred products and sharing actual experiences, community members also add to the enjoyment of the product. The contacts with other users increase the odds for receiving information about the product and learning how to become a more proficient user and finding practical assistance. The larger the community, the more information exchange is likely to take place both online and off line. So, although the community may affect each individual consumer differently, an argument can be made that if the community that provides and communicates all the information is larger, the link between past evaluations and behavioral intentions may be stronger (see also Moon et al., 2010). Finally, in creative goods and in information markets in general, there are always positive or negative evaluation outliers that are averaged out against the true qualities and value of the product if markets are larger. So, a larger community could also lead to more trust in the average past evaluation in the series, leading to a stronger carry over effect.

Summarizing, we argue that the size of user community will operate as a weighting factor with regard to the relationship between past consumer evaluations and sequel sales, irrespective of the evaluations of the sequel.

H4: *The type of product consumption moderates the effect of consumer evaluations of past editions on sequel success. The effect of consumer evaluations of past editions is more positive if the product is socially consumed in interaction with other consumers.*

2.3. Research method

The empirical material for this study consists of the video games belonging to various sequel series released between 2000 and 2009. Our data ($n = 479$) consists of solely console games with three or more sequels excluding the original title. The average number of sequels in our sample is four (excluding the original), and the largest is fourteen. Table I shows that Sporting games have the highest average number of editions per series (6). In terms of

worldwide unit sales, the most popular genres are Shooters (2.05 million copies), racing (1.87 million), and sports (1.43 million). The average sequel sells 1.36 million copies worldwide and 45 percent of the sequels obtain a Teen rating and 14 percent is rated for mature audiences.

Table 2.1 Sales and evaluations of the most popular genres

Genre	Avg. Editions per Series	Avg. Sales (millions of copies)	Avg. Consumer Evaluation (1-10)	Avg. Expert Evaluation(1-10)
FPS	3	2.05	7.67	7.72
RACING	4	1.87	7.82	7.25
RPG	3	1.24	8.51	7.73
SPORTS	6	1.43	7.71	7.87
OTHER	4	1.02	7.89	7.31

2.3.1. Model specification

The hypotheses are tested by estimating a comprehensive model regarding the antecedents of the total number of video games sold worldwide of a sequel i ($SALES_i$). A detailed overview of the variables is presented in Table II. Most importantly, the model takes the sequel evaluations from experts and consumers into account as well as the past evaluations in the series and their variability. The variable ($Prob(Sequel_i)$) is estimated by means of a first stage Probit model described later.

$$\begin{aligned}
 SALES_i = & \beta_0 + \beta_1 \cdot PCEA_i + \beta_2 \cdot PCEV_i + \beta_3 \cdot PEEA_i + \beta_4 \cdot PEEV_i + \beta_5 \cdot SoUC_i + \beta_6 \cdot ToUC_i \\
 & + \beta_7 \cdot CE_i + \beta_8 \cdot EE_i + \beta_9 \cdot TEEN_i + \beta_{10} \cdot MATURE_i + \beta_{11} \cdot FPS_i \\
 & + \beta_{12} \cdot RACING_i + \beta_{13} \cdot RPG_i + \beta_{14} \cdot SPORTS_i + \beta_{15} \cdot CHANGE_i \\
 & + \beta_{16} \cdot MULTI_i + \beta_{17} \cdot PCEA_i \cdot PCEV_i + \beta_{18} \cdot PEEA_i \cdot PEEV_i \\
 & + \beta_{19} \cdot PCEA_i \cdot SoUC_i + \beta_{20} \cdot PCEA_i \cdot MULTI_i + \beta_{21} \cdot Prob(Sequel_i) + \varepsilon_i
 \end{aligned}$$

Table 2.2 Overview of the variables

Variable name	Description
$SALES_i$	The worldwide unit sales (million copies) of video game sequel i .
$SoUC_i$	The size of the user community, measured as past unit sales average of all editions in the same series before the focal edition i .
$ToUC_i$	The trend in the size of the user community, measured as past unit sales trend (slope) across all editions in the same series before the focal edition i .
EE_i	Expert evaluations of sequel i .
CE_i	Consumer evaluations of sequel i .
$PEEA_i$	Past expert evaluations (average) given to all editions in the same series before the focal edition i .
$PCEA_i$	Past consumer evaluations (average) given to all editions in the same series before the focal edition i .
$PEEV_i$	Past expert evaluations (variance) of all editions in the same series before the focal edition i .
$PCEV_i$	Past consumer evaluations (variance) of all editions in the same series before the focal edition i .
$MULTI_i$	Video game with multiplayer option. Dummy variable.
$COMP_i$	Competition pressure that the sequel faces, measured as the number of other games with the same genre in the same year. For Probit model.
$CHANGE_i$	Attribute changes of sequel i . Measured as any change in ESRB rating, developer, or genre of the sequel compared to the previous edition. Dummy variable.
$TEEN_i$	ESRB rating of sequel i is Teen. Dummy variable.
$MATURE_i$	ESRB rating of sequel i is Mature. Dummy variable.
FPS_i	Genre classification of sequel i is FPS (First Person Shooter). Dummy variable.
$RACING_i$	Genre classification of sequel i is Racing. Dummy variable.
RPG_i	Genre classification of sequel i is RPG (Role Playing Game). Dummy variable.
$SPORTS_i$	Genre classification of sequel i is Sports. Dummy variable.

Expert evaluations and *consumer evaluations* are obtained from the *Metacritic.com* video games database, a widely used online site for evaluation scores and content information (e.g. Hennig-Thurau *et al.*, 2009; Luan and Sudhir, 2010; Plucker *et al.*, 2009). For each type of evaluation, the past average evaluation score is calculated across editions in the same series (excluding the latest sequel) and labeled Past Expert Evaluations Average ($PEEA_i$), and Past Consumer Evaluations Average ($PCEA_i$). In addition, we collected evaluation data related to the latest sequel itself, both from experts EE_i and from consumers CE_i .

Variability of past expert evaluations and variability of past consumer evaluations

were calculated by taking the variance of the evaluation scores of past editions in the same series. These variables are labeled as Past Expert Evaluations Variability ($PEEV_i$) and Past Consumer Evaluations Variability ($PCEV_i$). Variance is commonly used in the marketing literature to measure variability and uncertainty (e.g. Dacin and Smith, 1994; Desai *et al.*, 2008; Volckner and Sattler, 2006). Alternative variability measures will be discussed and applied in our robustness checks.

The size of the user community is measured by the number of legal discs in the marketplace ($SoUC_i$). Here the focus is on console games and the community size is measured across editions by averaging community sizes across editions in the series that were released before the sequel. Console gaming requires users to have the discs to play, so - despite possible second hand disc re-sales – the number of legal copies can be a good measure that represents the size of the user community at large. This approach also allows for users to drop out and others to take their place. We also developed a validation measure previously used by Hennig-Thurau *et al.* (2009). This measure only uses data from one edition before the focal sequel as a proxy for the user community size. The average number of copies across editions, however, seems to be more appropriate here as consumers may skip editions in the product series and come back to the series at a later stage. *Trend of the User Community* ($ToUC_i$) is used to control for the direction of the changes in the user community size. This variable is calculated by using the *Linest* function in *Excel* that estimates the slope of the trend line in terms of the number of disks sold across all editions before the focal sequel.

The other variables such as multiplayer functionality ($MULTI_i$), age rating ($TEEN_i$ and $MATURE_i$) and the genre dummies are obtained from *metacritic.com* and *vgchartz.com*. See Table 2.1.

2.3.2. Endogeneity of the sequel development decisions

Before we estimate the comprehensive model, we need to control for the fact that not all editions are succeeded by a new sequel. In other words, our estimation procedure must address the complex nature of the endogenous decision to develop a sequel or not. Ho *et al.* (2009) suggest a two stage equation system to tackle a similar problem. First we estimate a Probit model to approximate the developers' strategic decision to release a sequel into the market using a set of exogenous variables. In the second stage, the estimated probabilistic scores are included in the main model. This variable captures endogenous factors, which would otherwise be embedded in the error term of the main model.

The exogenous variables used in the first stage Probit model relate to the edition preceding the focal sequel only. The model is specified as follows:

$$\begin{aligned} & \textit{Probability}(\textit{releasing a new sequel } i) \\ & = \Phi(\alpha_0 + \alpha_1 \cdot \textit{SALES}_{i-1} + \alpha_2 \cdot \textit{COMP}_{i-1} + \alpha_3 \cdot \textit{MULTI}_{i-1} + \alpha_4 \cdot \textit{TEEN}_{i-1} \\ & + \alpha_5 \cdot \textit{MATURE}_{i-1} + \alpha_6 \cdot \textit{FPS}_{i-1} + \alpha_7 \cdot \textit{RACING}_{i-1} + \alpha_8 \cdot \textit{RPG}_{i-1} \\ & + \alpha_9 \cdot \textit{SPORTS}_{i-1} + \varepsilon_i) \end{aligned}$$

Table 2.3 presents the Probit regression results. $\Phi(\cdot)$ is the cumulative distribution function of the standard normal distribution. The Probit estimation shows that two determinants are significant at $p < .05$, namely $SALES_{i-1}$ and $MATURE_{i-1}$. This indicates that a successful game in terms of worldwide units sold, has a higher probability of getting a sequel (as expected) and games designed for mature audiences are also more likely to get a sequel compared to games for younger audiences. More importantly, the Probit estimation provides estimated values of the probability of having a sequel and this additional variable is included in the main model as a control.

Table 2.3 Probit regression results for developing a sequel i after edition $i-1$

Variables	Parameter estimates	
$SALES_{i-1}$	.639	***
$COMP_{i-1}$	.018	
$MULTI_{i-1}$	.014	
$TEEN_i$	.293	*
$MATURE_i$	1.450	***
FPS_{i-1}	.539	**
$RACING_{i-1}$	.013	
RPG_{i-1}	.161	
$SPORTS_{i-1}$	.515	**
Pseudo R^2	.142	

Note 1: Dependent variable: developing a sequel a sequel (1) or not (0)

Note 2: $i-1$ relates to the edition before the focal sequel i

Table 2.4 Descriptive statistics and correlation matrix

Variable Name	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 SALES _i	1.360	1.521																	
2 SoCC _i	1.637	1.835	.602**																
3 ToUC _i	.1154	.682	.187**	.090*															
4 EE _i	7.471	1.254	.394**	.252**	.136**														
5 CE _i	7.860	1.419	.116**	.014	.148**	.348**													
6 PEEA _i	7.597	2.150	3.01**	.401**	2.00**	.472**	.137**												
7 PCEA _i	8.029	1.086	.076	.101*	.137**	.085	.162**	.295**											
8 PEEV _i	.492	1.855	-.018	-.018	-.178**	-.029	-.014	-.044	-.025										
9 PCEV _i	.966	1.963	-.093*	-.142**	-.266**	-.071	-.173**	-.169**	-.247**	.042									
10 TEEN _i	.450	.498	-.051	-.066	-.075*	-.079*	.076*	-.025	.148**	-.005	-.100*								
11 MATURE _i	.140	.349	.152**	.134**	.049	.178**	.063	.121**	.052	-.042	-.143**	-.369**							
12 MULLI _i	.250	.434	.034	.046	.083*	.025	.055	-.097*	.006	.023	.038	.051	.221**						
13 FPS _i	.030	.184	.027	.034	-.076*	.003	.056	.028	.033	-.042	-.063	.001	-.204**	.094**					
14 RACING _i	.080	.277	.005	.079	.002	-.055	-.025	-.067	-.076	2.63**	.049	-.144**	1.29**	1.41**	-.054				
15 RPG _i	.060	.240	-.055	-.040	.071*	.062	.137**	-.038	1.23**	-.025	-.109**	.159**	-.050	-.346**	-.050	-.086*			
16 SPORTS _i	.180	.397	.062	.055	.091*	.210**	-.037	1.78**	-.041	-.067	.070	-.296**	.196**	.255**	-.082*	-.142**	-.131**		
17 COMPI _i	29.510	16.909	.033	.005	-.029	.045	-.152**	.102*	-.121**	-.045	.192**	-.154**	-.083*	.097**	-.296**	-.190**	-.425**	.478**	

* Significant at $p < 0.05$
 ** Significant at $p < 0.01$
 Sales in million units

2.4. Empirical results

Table 2.4 presents the correlation matrix and the descriptive statistics of the study's key variables. The correlation analysis provides preliminary evidence that expert evaluations and consumer evaluations have a positive and significant correlation with worldwide unit sales ($r = .394, p < .001$, and $r = .116, p < .01$ respectively). There is a significant correlation between worldwide unit sales and the average past expert evaluation ($r = .301, p < .001$), but not between worldwide unit sales and the average past consumer evaluation ($r = .076, p > .05$). It is also interesting to note that the variability of expert evaluations is only weakly correlated with the variability of consumer evaluations ($r = .042, p > .05$), hinting at a low level of shared variance between the different types of evaluations.

2.4.1. Test of the hypotheses

The results of the two stage regression estimation are presented in Table 2.5. The variables that are included in an interaction are mean centered to reduce multicollinearity and the VIF values show that multicollinearity is not a major concern here. A total of up to 69% of variance in unit sales of sequels is explained. This level of explained variance is quite high and somewhat higher than a comprehensive study on sequel fit and success in the motion picture industry (Hennig-Thurau *et al.*, 2009). In their study, the number of screens, which is known to explain most of the variance in box office performance, is included in the model while in a game setting such a variable is not available.

Table 2.5 The estimation results of the main regression models

Variable Name	MODEL 1		MODEL 2	
	β	VIF	β	VIF
<i>Series Evaluations:</i>				
$PCEA_i$	.299 ***	1.643	.283 ***	2.336
$PCEV_i$	-.084 *	1.538	-.081 *	1.663
$PEEA_i$	.172 ***	1.724	.162 ***	1.521
$PEEV_i$	-.016	1.170	-.010	1.538
<i>User Community:</i>				
$SoUC_i$	.501 ***	1.408	.514 ***	1.789
$ToUC_i$	.086 *	1.525	.089 *	1.702
<i>Sequel Evaluations:</i>				
CE_i	.086 *	1.597	.068 *	1.735
EE_i	.118 **	1.717	.115 **	1.831
<i>Sequel Characteristics:</i>				
$TEEN_i$	.039	1.813	.022	1.833
$MATURE_i$	.295 ***	1.891	.296 ***	1.919
FPS_i	.012	1.223	.019	1.236
$RACING_i$	.040	1.139	.043	1.164
RPG_i	.046	1.201	.043	1.219
$SPORTS_i$	.098 **	1.123	.101 *	1.133
$CHANGEATTR_i$	.041	1.142	.041	1.133
$MULTI_i$	.091 *	1.089	.082 *	1.887
<i>Interactions:</i>				
$PCEA_i \times PCEV_i$	N/A		-.184 ***	2.127
$PEEA_i \times PEEV_i$	N/A		-.096 **	1.578
$PCEA_i \times SoUC_i$	N/A		.083 *	2.266
$PCEA_i \times MULTI_i$	N/A		.141 ***	2.187
n	479		479	
R^2	.667		.694	
Adj R^2	.656		.682	
F Change	61.787 ***		10.535 ***	

* Significant at $p < .05$

** Significant at $p < .01$

*** Significant at $p < .001$

Note 1: The dependent variable is unit sales (in millions)

Note 2: We estimated the model with the first stage parameter (Prob(Sequel_i)). In Model 1: $\beta_{21} = .316^{***}$; Model 2: $\beta_{21} = .310^{***}$

Our results show that there is a significant improvement in explained variance between our simple Model 1 and the comprehensive Model 2 ($\Delta R^2 = .027$; $\Delta F = 10.535$; $p < .001$). We use the standardized results of our comprehensive model (Model 2) to test the hypotheses because we use different response scales to measure different constructs. The

relationship between consumer evaluations and worldwide sequel unit sales is significant and positive ($\beta = .068$; $p < .05$), as is the case for expert evaluations ($\beta = .115$; $p < .01$). The results also show that the average past expert evaluation in the series has a significant and positive relationship with unit sequel sales ($\beta = .162$; $p < .001$), and this positive relationship is also found for past consumer evaluations in the series ($\beta = .283$; $p < .001$). To interpret these relationships, the nature of the interaction has to be taken into account. We note that the coefficient related to variability of past consumer evaluations is negative and significant ($\beta = -.081$; $p < .05$) and the same direction is observed regarding the variability of past expert evaluations, however, the significance level is lower ($\beta = -.010$; $p > .05$).

The interactions between past evaluations in the series and their variability obtain negative and significant coefficients (consumers: $\beta = -.184$; $p < .001$; experts: $\beta = -.096$; $p < .01$). The relationships are visualized in Figure 2.1. for past expert evaluations and in Figure 2.2. for past consumer evaluations. For the purpose of visualization, the evaluation scores are split based on a median split. Figure 2.1. and 2.2. show that positive past evaluations are generally associated with higher levels of sequel success (supporting H1a and H1b), even after controlling for the evaluations of the sequel itself. The positive slopes in both figures show that positive evaluations of past editions are positively associated with sequel unit sales but that this relationship is more positive if variability across editions is low supporting H2a and H2b.

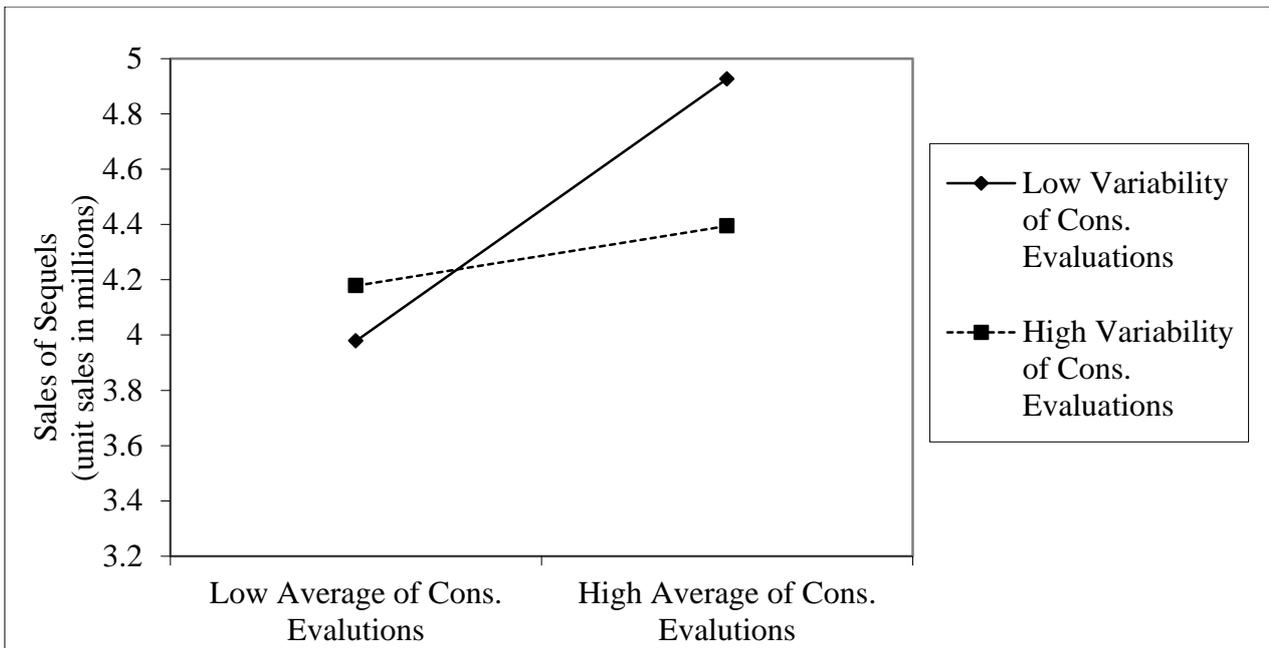


Figure 2.1 Sequel sales and past consumer evaluations in the series (low versus high variability across editions)

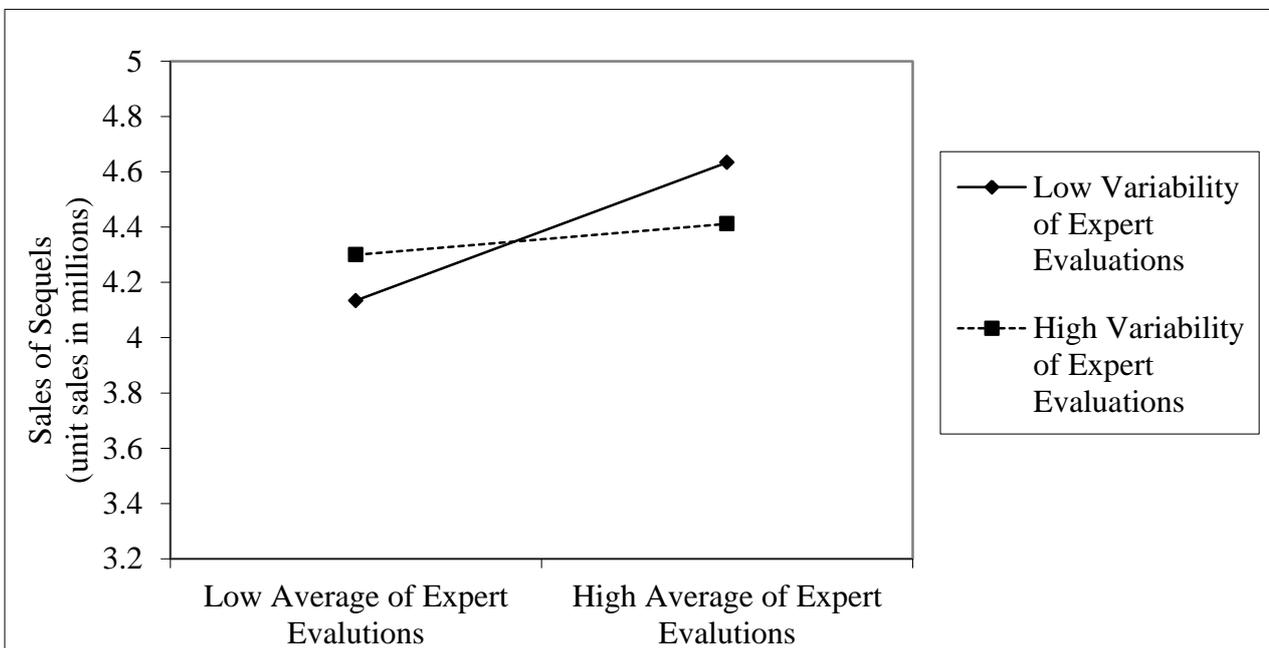


Figure 2.2 Sequel sales and past expert evaluations in the series (low versus high variability across editions)

The size of the user community plays an important role in the unit sales of the sequel ($\beta = .514$; $p < .001$). The interactions between this variable and the average past consumer evaluation in the series is significant ($\beta = .083$; $p < .05$). The nature of this interaction is visualized in Figure 2.3 showing that the relationship between positive consumer evaluations

of past editions and worldwide unit sales of the sequel is more positive for larger communities supporting H3. We also find a significant interaction between consumer evaluations of past editions and whether the product is a multiplayer game enabling social interaction while consuming the product ($\beta = .141$; $p < .001$). Figure 2.4 shows that positive consumer evaluations of past editions are positively related to unit sales of the sequel. This relationship is more positive for series with multiplayer functionality such as *Pro Evolution Soccer* from *Konami*. This supports H4.

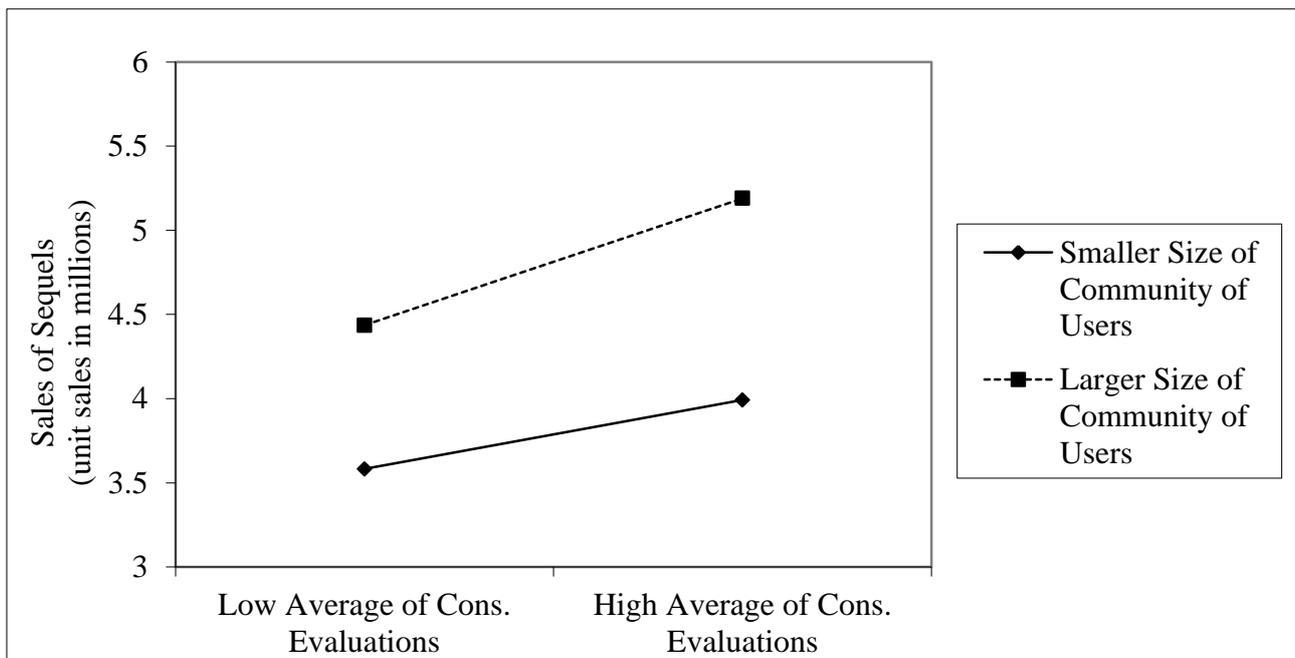


Figure 2.3 Sequel sales and past consumer evaluations in the series (larger versus smaller communities of users)

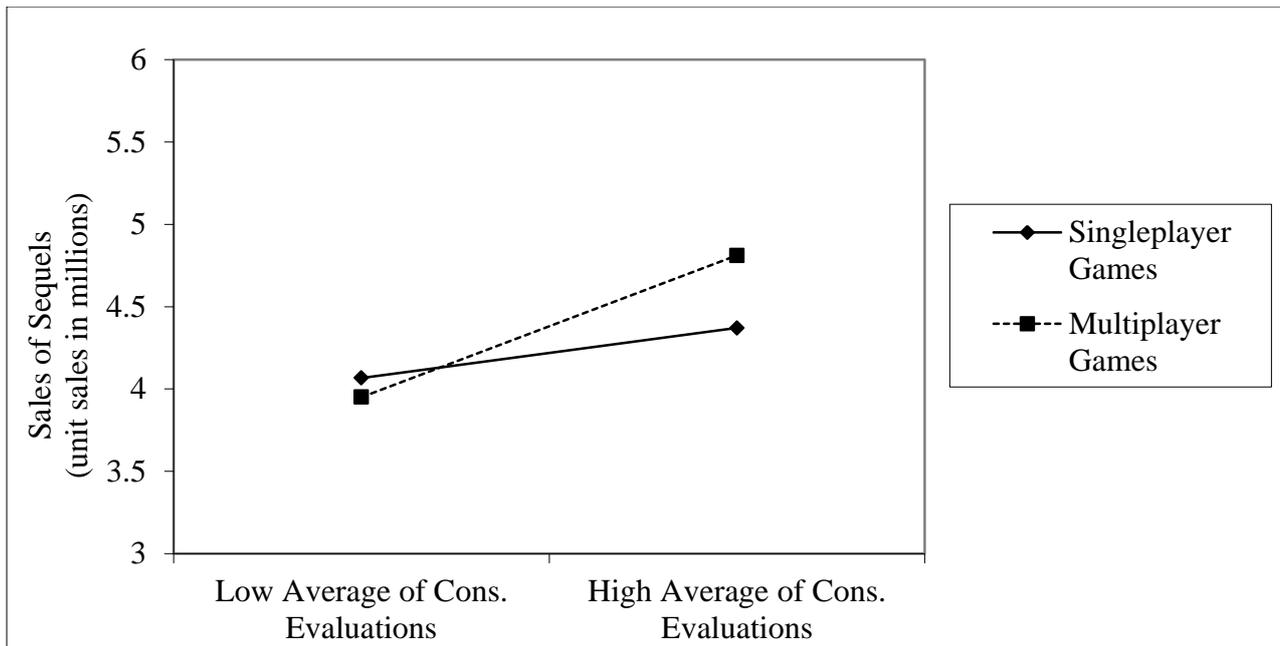


Figure 2.4 Sequel sales and past consumer evaluations in the series (single player versus multiplayer games)

2.4.2. Robustness tests

We first test the robustness of our results using alternative measures of variability and community size. The first alternative variability measure takes the number of products in the series into account by dividing the variance across evaluations of past editions by the number of editions before the focal sequel (c.f. Desai *et al.*, 2008). Using this new operationalization in our model, we find similar relationships, including the moderating effect of past consumer variability ($\beta = -.173, p < .001$), and the moderating effect of past expert variability ($\beta = -.081, p < .05$).

The second alternative measure of variability is based on the volatility index from finance where this measure is used to measure the relative volatility of a stock compared to the overall portfolio (Levinson, 2006). Again, we find the same results. The moderating effect of variability (volatility approach) of consumer evaluations is negative and significant ($\beta = -.131, p < .001$), and the coefficient of expert variability is negative but not significant ($\beta = -.043, p > .05$).

As an alternative measure of the size of the user community, the number of disks sold of the edition immediately preceding the sequel is used (Hennig-Thurau, Houston, and Heitjans, 2009). As with our original findings, the coefficient of the size of the user community is positive and significant ($\beta = .453, p < .001$), and the interaction variables are also very similar. Also, using logged variables for user community size and unit sales does not alter our findings.

The model obtains a high fit and we are also interested in the performance of our model in terms of predicting the success of future sequels. For this, we collected new data on 27 video game sequels released between January 2010 and March 2011. The model estimates are used to compute predicted worldwide sequel sales in units and compare it with the realized worldwide sequel sales. The correlation between the predicted and real values are high and the t-statistic of the difference between actual versus real performance is not significant ($r = .647, p < .01$), with a t-value of 1.155 ($p > .05$). Table 2.6 gives some examples of sequel series and their predicted and actual sales in million units. These numbers show that the two sets of values (predicted and actual) are quite similar.

Table 2.6 Example sequels released in 2010-2011 and their predicted and actual sales (million units worldwide)

Title	Genre	Release Date	Predicted	Actual
MotoGP 10	Racing	7-Dec-10	.25	.19
Dynasty Warriors 7	Action	29-Mar-11	.79	.71
Tiger Woods PGA Tour 11	Sports	29-Mar-11	.61	.77
Dragon Ball Z: Burst Limit	Fighting	2-Nov-10	.79	.89
Fight Night Round 4	Sports	1-Mar-11	1.23	1.41
Pro Evolution Soccer 2010	Sports	19-Oct-10	1.51	1.57

2.5. Discussion and conclusions

The starting point of this study was that sequels, because they form part of a recognizable series, are considered to benefit from a ‘carry over’ effect of the positive image of previous editions (c.f. Hennig-Thurau et al., 2009). This study adds to the discussion, by showing that the carry over effect is active across the whole series and that the impact of the carry over effect depends on observable weighting factors as suggested by a broader framework derived from the theory of reasoned action.

Our findings offer an in-depth perspective on the role of consumer (and expert) evaluations, i.e. not just as a signal of consumer (expert) appreciation towards the product but also as input for the consumer attitude formation towards the series as a whole and as a constituent of subjective norms that have an effect on behavioral intentions towards the product and the series as a whole. More importantly, we conclude that every edition in a series of products matters because if there is a poor quality edition in the series, it will hurt the success of later sequels through two mechanisms. First, the lower evaluation will carry over to the sequels that follow. Second, the variation that results from inconsistent evaluations across editions creates uncertainty (volatility) and a less favorable weighting of past qualities in the series.

There is a broader debate in the creative industries that creative products are different. “The very act of consumer choice in creative industries is governed not just by the set of incentives described by conventional consumer demand theory, but by the choices of others” (Potts et al. 2008). This study shows that the general framework behind the theory of reasoned action is particularly useful in the creative product arena because it focuses on individual attitudes and external subjective norms that are weighted. So, apart from the substantive findings on sequels in an important industry, we show the applicability of the theory of reasoned action as a framework in the creative industries.

2.5.1. Implications, limitations, and future research

The results have several implications for marketing research and marketing practice. First, this study is the first attempt to apply the theory of reasoned action to the discussion of sequels. The theory of reasoned action offers a comprehensive framework for studying the impact of evaluations on consumer behavior even when, as in this study, the individual consumer remains a black box.

Second, the comparison of the effects of expert and consumer evaluations contributes to the ongoing discussion about the impact of consumer reviews on performance of the product, which has obtained mixed findings so far (e.g. Liu, 2006; Gemser et al., 2007). The impact of consumer evaluations may not lie only in their role as a quality signal but also - and as our study suggests, in some cases even more strongly – in their role as subjective norms that co-determine individual intentions and resulting behavior.

Third, this study points the way towards further research on the effects of variability across editions and time, especially as a moderator of other signals of quality. Variability can be conceptualized and operationalized differently from the way we have done. Variability relates to volatility and more research is needed on ambiguity and noise regarding evaluations. More research is also needed regarding fake evaluations and how they affect consumer decision making behavior regarding sequels.

Fourth, the focus on the type of community of users points towards the need for more in-depth research of the particular mechanisms through which communities have more or less impact on the success of the new product. With respect to the behavior of their members, this study has paid specific attention to the extent to which products are consumed while interacting with other consumers, but, while this study only distinguished between single

player and multiplayer games, other products may offer more opportunities to characterize relationships and interaction during consumption.

Inevitably, this study has several limitations. First, the empirical relationships found in this study come from the video game industry. More research is needed to validate our findings and analyze other types of products, especially non-creative products, such as automobiles where communities and past reviews may also influence sales of product extensions. Second, the relatively high level of anonymity of online consumer evaluations means that with the current approach, one cannot determine the actual repurchasing behavior of individual consumers who post online reviews, nor can the contacts between real consumers be directly observed. Future studies may use data that reflect the behavior of individual consumers, as well as their contacts within the community. Third, in this study we did not control for the success of the original franchise outside the video game industry – such as Batman or Spiderman comics and films. Where video games are derived from movies – the Harry Potter video games for example, are built on and released together with the movies – the current approach does not account for how the original movies' or books' popularity might affect the performance of the associated video games. Fourth, OLS is used to test the main models, which is common in this area (c.f. Hennig-Thurau et al., 2009) but one may argue that a multilevel approach could better suit the data as editions in a series are related. When more series become available with a long history of editions, this approach becomes feasible.

3. History matters: The impact of evaluations and sales of earlier versions of a product on consumer and expert evaluations of new editions of products²

Abstract

Product evaluations are assumed to be based on the observable characteristics of the underlying product. However, in the case of new editions of product the determinants may include signals that originate from the evaluations and the sales of editions that precede the focal product edition. Our analysis of 577 video games released between 2000 and 2009 indicates that the evaluations of earlier versions have a positive relationship with the evaluations of the sequel by the same type of evaluator. We also find that expert evaluations are influenced by the average evaluation of previous edition by consumers and the average sales of previous versions of the product. This suggests that experts tend to adapt to the taste of consumers. Furthermore, it is found that a lack of consensus, between evaluators of a particular type, weakens the impact of average past evaluations, whilst it magnifies the impact of the sales of earlier versions.

Keywords: Sequels, evaluations, experts, consumers, variability

3.1. Introduction

Consumer demand is highly uncertain in the creative industry, which is why producers tend to reuse ideas and concepts that have been known to be successful in the past (Tschang and Szczypula, 2006). As a result, the strategy of releasing new products as sequels has become increasingly popular in this industry (Rosen, 2011). New editions of successful brands such as the Harry Potter, Batman, Superman, and many others are brought to the market in the form of a product series. In the videogame industry, for example, the sequels of series such as Mario Brothers, Pokemon, The Sims, World of Warcraft, and Call of Duty, have generated billions of dollars of revenue (Philips, 2011).

The experiences that consumers have had with the editions that precede the sequel have been found to be the major contributor to the market success of these sequels (Völckner and Sattler, 2006). To explain this relationship, it has been argued that the ideas and

² This chapter is conditionally accepted in the European Journal of Management

impressions connected to the earlier editions are transferred to the next edition (Keller 2003; Erdem, 1998; Sunde and Brodie, 1993) and that the popularity of the past editions build up anticipation and excitement towards the new editions (Dhar, Sun, Weinberg, 2012; Ho, Dhar, and Weinberg, 2009; Karniouchina, 2011). In this way, the new editions can profit from the success of the earlier editions, but their market performance can also suffer from the comparison with the earlier success. The excitement and anticipation created by the previous performance generates high expectations that can easily lead to a lower level of satisfaction (Anderson, 1973; Oliver, 2009). It has also been found that the market performances of movie sequels are generally lower than that of the original editions (Basuroy and Chatterjee, 2008). Sequels by definition also retain the core attributes of their original parent products and are often considered less innovative (Sood and Dreze, 2006). However, this paper does not analyze the factors that predict sales, but the factors that predict the evaluations themselves.

Whilst previous studies have discussed the notion of image transfer from a product to a new edition, they appear to overlook how the positive appreciations of past editions in the product series are transferred to the evaluations of the new edition. Even though the notion of the product image being transferred from one edition to the next is widely accepted in the literature, signals such as product evaluations are usually treated as independent determinants of sales performance. At the same time, it is usually assumed that product evaluations (or reviews) are based on the observable characteristics of the underlying product. However, as we will argue more extensively below, in the case of new editions of products the determinants may be more complex and include peripheral signals that do not originate from the focal product itself, but reflect the performance of earlier editions.

The quality of a product is always the quality as perceived by observers, and sales performance as well as product evaluations provide indicators of how this quality is

perceived. When the core attributes remain the same between editions, it is reasonable to assume that the "underlying" quality of the product has not changed and that therefore evaluations of the new editions will not differ much from evaluations of the past editions, or just decrease a bit because of the same general reasons of unfulfilled expectations and lesser perceived innovativeness that have been proposed with regard to the sales performance of sequels. This paper looks more closely at the question whether evaluations of past editions indeed predict the evaluations of the new edition and proposes and tests arguments explaining why the evaluations of the new edition can be different from those of the past editions.

The first aim of the paper is to build on insights from a number of theoretical perspectives and, in particular, from signaling theory (Spence, 1973; Kirmani and Rao, 2000; Connelly et al., 2011) to construct and empirically test a model that explores the connections between how well past editions did, in terms of the evaluations of both consumers and experts (and of sales performance), on the expert and consumer evaluations of the new edition.

The second aim of this paper is to explore the effects of the lack of consensus in the evaluations of past editions as a determinant of the evaluations of future editions. Most earlier studies on the effects of product evaluations focus on the average evaluation, which hides the fact that consumer and expert evaluations are often polarized, leading to fluctuations around the mean (Sun, 2012). Consumers and experts can easily observe the differences and distribution of product evaluations (Chevalier and Mayzlin, 2006), and the dispersion or variability of evaluation have a significant effect to consumer behavior (Sun, 2012). Following this recent development in the literature, we include variability of product evaluations in our research. In particular, we explore the effects of the lack of consensus among evaluators of the same type evaluating the same edition - with regard to both communities of evaluators: the consumers and the experts.

Our study contrasts with earlier studies (e.g. Keller, 1993; Hennig-Thurau, Houston and Heitjans, 2009), in which consumer evaluations and expert critics evaluations were considered as items pertaining to the single construct "brand image". Other studies have also pointed out that consumers and professional experts are members of different communities that interact differently with competitive processes (Wijnberg and Gemser, 2000), and in which different criteria are used to determine product value (Bhansing, Leenders, and Wijnberg, 2012; Gemser, Leenders and Wijnberg, 2008; Plucker et al., 2009; Moon, Bergey, and Iacobucci, 2010). These studies suggest that, even if, in a particular industry, consumer and expert evaluations do have similar effects on sales, the determinants of the evaluations themselves - the main focus of this paper - can be very different.

The setting of the study is the creative industry, in particular, the video games industry. As we have pointed out before, evolving products through a series of new editions is a very popular strategy in this industry (Tschang and Szczypula, 2006), which makes this industry a suitable setting to our purpose. In addition, the creative industries offer the advantage of the availability of large publicly accessible online databases (e.g. metacritic.com, vgchartz.com, imdb.com, etc.) of evaluations and sales. Even though our analysis is based on the creative industry, the results of our analysis can be generalized to other industries where producers bring products on the market in a series and where product evaluations are influential factors for consumer buying behavior, such as the automotive industry, cellphones, or laptops among many others.

3.2. Theory and hypotheses

3.2.1. Product evaluations as signals and the conceptual model

Product evaluations, both by experts and other consumers transmit information about the product. When reliable information is scarce, especially if the quality of the product is difficult to evaluate before consumption, both types of evaluations can have a strong impact on consumer behavior (Basuroy, Chatterjee, and Ravid, 2003; Caves 2000). A recent study suggested that 62% of consumers read (online) evaluations and almost half of them (49%) read the evaluations of competing products/services before deciding which product or service to buy (Lightspeed Research, 2011). This supports an earlier study that found that 82% of consumers say that their purchase decisions have been directly influenced by product evaluations (Deloitte, 2007).

The prominence of evaluations in the online and offline world has led many scholars to explore how evaluations affect sales, with initial studies focusing on the impact of expert evaluations (e.g. Basuroy, Chatterjee, and Ravid 2003; Boatwright, Basuroy, and Kamakura, 2007; Eliashberg and Shugan, 1997; Reddy, Swaminathan, and Motley 1998). More recently there have been an increasing number of studies that pay attention to the effects of evaluations by consumers (e.g. Liu, 2006; Zhu and Zhang, 2010). Considered from the perspective of signaling theory (Spence, 1973; Kirmani and Rao, 2000; Connelly et al., 2011) both consumer evaluations and expert evaluations signal the quality of the product being evaluated, which in turn reduces consumers' uncertainties regarding the product.

Despite the interest in analyzing the effects of evaluations on sales, the determinants of the evaluations themselves have not been studied systematically. Rather it is assumed that the evaluations are simply reflections of how well the characteristics of the product fit quality standards and the preferences of the evaluator. It is assumed that the signals that are taken into account to arrive at the evaluation are those can be directly linked to the product that is

evaluated (Spence, 1973; Johnson and Levin, 1985; Kirmani and Rao, 2000). However, products in a series of editions may violate this assumption because each new edition strongly associated with previous editions in that series. For this reason, signals that pertain not to the product itself but to these previous editions - and their performance - can affect the evaluation of the focal product. The term "peripheral" signals is used to denote signals that do not directly relate to the characteristics of the evaluated product itself. Such peripheral signals include 1) the evaluations of earlier versions, and 2) the sales performance of earlier versions.

With regard to the effects of earlier product evaluations, the default expectation would be continuity; such that if the previous edition received on average a positive evaluation score from a community of evaluators, the focal edition will also be evaluated positively by that same community. However, average evaluations scores tell only part of the story. Another signal that is important is the variability of evaluations within each community of evaluators - experts or consumers - as this reflects the extent of the consensus among evaluators within their respective community. This can potentially influence the effects of past evaluations and past sales. The role of variability as an amplifier of peripheral signals on the evaluations of the focal edition will be discussed and tested more extensively in the following sections. The conceptual model that outlines the relationships of peripheral signals with expert evaluation and consumer evaluation is presented in Figure 3.1.

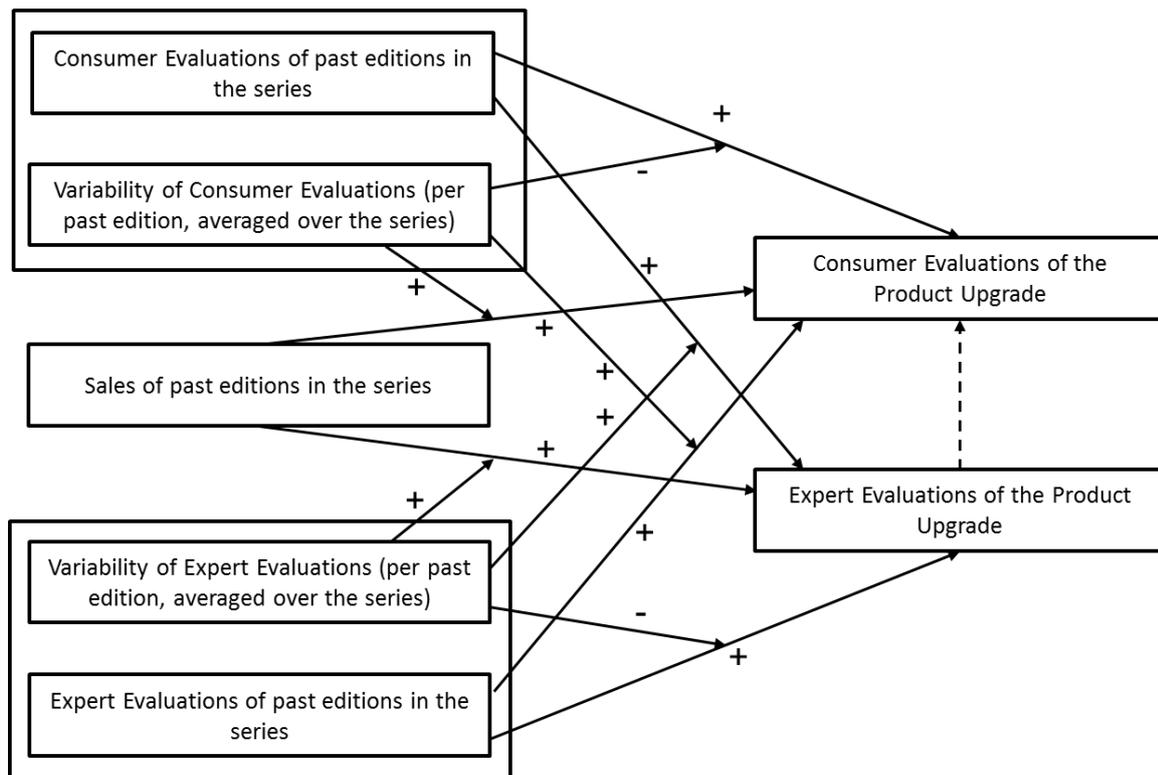


Figure 3.1 Conceptual Model of the Determinants of Expert and Consumer Evaluations of Product Upgrades

3.2.2. The relationship between past evaluations and the evaluation of new edition

Products with the same brand name are often closely linked to each other, and that information about one member of the series is also valid for another product from the same series (Erdem, 1998). The performance of new editions will be - at least partially - determined by the extent that there is a carry-over of the consumers' image of the past editions to the next editions (Keller 2003). In line with the previous research, past certifications of a baseball player has been found to influence his long-term reputation, by virtue of what is called the "reputation halo" (Griffin and Ward, 2010). If these arguments are seen from the perspective of signaling theory, past performance track records can signal the predicted future behavior (Perks and Halliday, 2003). In the same way, one may argue that past evaluations are also *signals* of consumers and experts appreciations of *the series*, thus

the evaluation affects not only the sales of the particular editions that the evaluations address, but also those of the potential new members of the series that are released *in the future*.

In addition to consumers' tendency to link past performance with current performance (Aaker and Keller, 1990; Erdem, 1998), consumers learn about and familiarize themselves with the "franchise" by consuming a series of sequels or editions of the product (Rothschild and Gaidis, 1981). The familiarity and the increased knowledge it implies, can be considered to be present in the community of consumers. Unless there is a major change in the product attributes, such knowledge is constantly reinforced by the characteristics of the "reminders" that conserve or elicit specific product memories (Hoyer, 1984). Therefore, the product evaluations by consumers of earlier editions in the same series signal are not just signals of how attractive to consumers these particular editions are, but also of the attractiveness of the franchise or series as a whole. Considering this aspect of consumer evaluations, as indicators of the quality, as perceived by consumers, of the series, one can expect there to be continuity in average response of consumers to the subsequent editions of the series. For this effect to operate, one does not have to assume that consumers know of the consumer evaluations of the previous editions. It suffices that these evaluations are at least partly influenced by characteristics that are attributed to the series as a whole. This suggests:

H1a: Consumer evaluations of past editions in the series have a positive relationship with consumer evaluations of the new edition of the product.

The general arguments presented above with respect to consumer evaluations seem also applicable to the relationship of expert evaluations of past editions with expert evaluations of the new edition. New editions or sequels are very similar to the original product in terms of core product attributes and physical form. Due to the similarity between

them, the attitudes towards the original product and the new edition can also be expected also similar (Aaker and Keller, 1990).

At the same time, there can be additional mechanisms in play with regard to the experts, which are not or much less relevant for the consumers. Expert reviewers might be more wary of publicly changing their opinions about particular franchises, since their professional reputation will be linked to their evaluations and changing their mind might harm their credibility. Consequently, expert opinions of the new edition would be very similar to the evaluations given to the earlier products in the series – unless the new edition deviates significantly from the core attributes and characteristics of the series.

The above argument suggests that the expert evaluations will remain even more constant than those of the consumers. However, there is also an argument suggesting an effect in the opposite direction. Professional critics are more likely to notice in new editions of the same product a lack of creativity and innovation (e.g. Hudson, 2011; Kondoloy, 2012), which suggests that maintaining a similar product attributes would lead to a downward trend of expert evaluation from one edition to the next. This is especially likely in high-art industries, in which innovativeness as such completely dominates the quality judgment (Wijnberg and Gemser, 2000), while in other industries precisely maintaining the positively-valued traditional attributes of the brand or franchise is more likely to be approved of. Thus, we would not expect the additional (compared to the case of the consumers) negative effect to be very strong or outweigh the possible additional positive effect. It is therefore hypothesized that:

H1b: Expert evaluations of past editions in the series have a positive relationship with expert evaluations of the new edition of the product.

3.2.3. The relationship between past sales performance and the evaluation of new edition

Sales performance of a previous edition denotes the number of units of a product sold to consumers, which is also an indicator of the attractiveness of the previous version among the consumers (Hennig-Thurau, Houston and Heitjans, 2009). As one main reason of a signal is to reduce the uncertainty about a product by informing consumers what can be expected from it, past sales as a peripheral signal can also serve as a reflection, to some extent, on how well the series has been appreciated over time by consumers in general across past editions in the series.

In addition to signaling the popularity of the product among consumers, past sales also indicate how many consumers know about the product series. The higher the number of consumers who know about the series, the higher the likelihood of Word-of-Mouth communication about the product, which in itself can have an effect on subsequent sales (Duan, Gu and Whinston, 2008). Consumers talk more about financially successful movies than unsuccessful movies, which would affect subsequent revenues (Moon, Bergey and Iacobucci, 2010). So, the larger the number of product evaluations from individual consumers, the more likely it will be that consumers will communicate with other consumers about the product, reinforcing possible positive sentiments towards the product, as well as creating social pressure to try the new edition. It is therefore hypothesized that:

H2a: The sales performance of past editions in the series has a positive relationship with consumer evaluations of the new edition of the product.

It may be argued that past sales are less likely to influence critics. Consumer evaluations and sales performance are both measurements of how well consumers appreciate the series. Expert critics, however, are supposedly different from consumers. Precisely

because they are professionals, it is commonly assumed that expert critics are *independent* evaluators, who often, at least in the case of movies, make up their opinions before the public launch of the product (Debenedetti, 2006). Some might be susceptible to bribes of favors from the producers (Cameron, 1995; Eliashberg and Shugan, 1997; Mol and Wijnberg, 2007), but sales performance in itself is not likely to sway their judgment. They are assumed to be unbiased, willing to educate the public, and to evaluate based on how they perceive the product, rather than being influenced by the success of earlier editions of the series among consumers.

However, the real state of affairs may not match this idealized picture, particularly in market driven industries such as the video games industry (Adams and Rollings, 2003; Phillips, 2011). The dominant selectors in a market driven industry are the consumers (Wijnberg and Gemser, 2000). Professional experts are selected by the media in which their evaluations appear (Liu, 2006; Chen, Liu and Zhang, 2012). They are often employed by, or at least affiliated to, media outlets, i.e. newspapers, magazines, tabloids, radio/television shows, websites, etc., and obtain economic compensations for the reviews that they write. Most of these outlets are profit-seeking entities and are prone to market pressure in terms of maintaining readership to ensure their economic viability. The media outlets tend to the needs of their readers and elevate them as 'the newsroom's giants with the status of equal partner in decision making' of the media's content (Beam, 2003, 368). In this way, the perceived preferences of the readers are likely to influence the judgments of the expert reviewers who work for the media. In so far as readers might also be consumers of the product, the sales success of earlier editions might provide a strong signal to the media outlets, and then, directly or indirectly, to the expert critics themselves, that this is a product that readers like. The first effect of observed past popularity on reviews would be to increase the chance of being reviewed. This is of particular importance in industries where only a fraction of

products is professionally reviewed, such as book publishing. Furthermore, one can expect a strong effect on the valence of the reviews, and this is of relatively greater importance in an industry where most or all products can expect to receive expert reviews, such as mainstream movies or video games. When there is a clear signal that a series is particularly popular among the consumers, writing a negative review about a new edition in this series means that the expert writes against the 'will' of the market. By doing so, the expert would risk estranging him/herself, and the medium in which the review appears, from the readers, particularly in industries where market selection is very dominant. In addition, if an expert's opinion is not in line to the consumers' preferences, the readers can also start to question the credibility of that expert. Therefore, if the product is part of a series, earlier sales performance could well have an effect on the expert reviews. This suggests:

H2b: Sales performance of past editions in the series has a positive relationship with expert evaluations of the new edition of the product.

3.2.4. Consensus in the community of evaluators as a signal-amplifier

In most social groups evaluations of the same object will vary among group members due to individual differences, in taste or perspective (Boor, 1990; West and Broniarczyk, 1998). A high variability of the evaluations of the same object within the same group can be understood as a lack of consensus, among group members, with regard to the object. This variability of opinions has received little attention in the literature on the effects of evaluations (exceptions are: Sun, 2012; and Das and Chen, 2007).

Initially, the discussion regarding the effect of variability of opinions focused on the finance sector (Das and Chen, 2007). The results of this research suggest that there is a strong relation between the variability of opinions among stockbrokers (as observed in their web

discussions) and downward movements in the actual stock price (Das and Chen, 2007). More recently, it is also found that the interaction of the average consumer evaluations of books and the standard deviation of these evaluations has a significant effect on the demand, i.e. products with low ratings would benefit from high variability of ratings, while products with higher rating would suffer from the variability of the ratings (Sun, 2012). In contrast to the previous two studies, the main aim of our research is to study the determinants of evaluations, not of demand. Moreover, we will look at variability as a moderator of the effects of the other signals, such as average past evaluations.

We start again from the perspective of the consumer. With regard to each past edition of the product there can be a higher or lower consensus. If, on average, consensus is low over the series of past editions, this can signal that, on an aggregate level, it was very difficult for the evaluators as a group to assess the qualities of these past editions. Although expert evaluators may be more likely to pay explicit attention, consumers do as well observe and notice the differences and the distributions of product evaluations across time (Chevalier and Mayzlin, 2006; Sun, 2012). Given that, as we argued above, average evaluations of past editions will have an effect as a signal of quality pertaining to the franchise or the series as a whole, it is likely that high variability in these evaluations of past editions will diminish the effect of this signal, precisely because the high variability, and especially variability that remains high over a series of editions, will denote that the evaluators in a particular community cannot easily agree about the quality.

Additionally, a lack of consensus decreases the chance that consumers will expect to see their opinions reinforced by other consumers, which may affect the likelihood that they will express their opinions or, at least, express them strongly (c.f. Neuwirth, Frederick, and Mayo, 2007; Oshagan, 1996). These arguments suggest:

H3a: The relationship of past consumer evaluations with consumer evaluations of the new edition of the product is moderated by the degree of consensus among consumer evaluators of past editions. The relationship is less positive if there is a lower degree of consensus.

With regard to the experts, we would expect a similar general effect, that the evaluations of past editions become less convincing as a signal of the qualities of the whole series when consensus among expert evaluators of these past editions has been low. Moreover, given that expert critics are professionals, they often find it necessary - also as a sign of professionalism - to take their peers' opinions into account and even comment on them in their reviews (Das and Chen, 2007). Although in high art industries there might be a premium on being an innovator among reviewers (Wijnberg and Gemser, 2000), in most other contexts a striving for consensus among critics has been observed (Van Rees, 1987; Hsu, 2006; Shoemaker and Vos, 2009), eventually leading to consecration of some products (Allen and Lincoln, 2004; Allen and Parson, 2006; Graffin and Ward, 2010). When experts generally agree, there will be very little benefit for an individual expert in publicly disagreeing. However when there is no clear consensus among the members of the expert community, individual experts will be less constrained and more likely to express opinions that diverge from the average expert evaluations of past editions. This suggests:

H3b: The relationship of past expert evaluations with expert evaluations of the new edition of the product is moderated by the degree of consensus among expert evaluators of past editions. The relationship is less positive if there is a lower degree of consensus.

As has previously noted, the main function of evaluations as signals is to reduce uncertainties by providing information regarding the product (Kirmani and Rao, 2000). If particular signals leave the consumers with an ambiguous message and increasing uncertainty, consumers will rely more strongly on other types of information (Choi, 1993). The lack of consensus among reviewers would lead to consumers seeking alternative sources of information to form estimates of the quality of the product (West and Broniarczyk, 1998). Thus, when a particular signal creates more uncertainties, other signals will be more likely to have an effect on consumer behavior. As discussed, a lack of consensus among the evaluators of a particular type makes the average evaluations of past editions less clear or trustworthy signals to the evaluators, of the same type, of new editions.

When consumers evaluations of past editions are highly variable, consumers will give more weight to other signals, and the same will hold for consumer evaluators. As discussed, the sales of previous editions are also signals of the quality of the whole series to the consumer evaluators. We would therefore expect that the weaker the signal of the evaluations of past editions is, because of the low consensus, the more the consumer evaluators will rely on the other signal conveying similar content, namely sales of past editions.

H4a: The relationship of past sales with consumer evaluations of the new edition of the product is moderated by the degree of consensus among consumer evaluators of past editions. The relationship is more positive if there is a lower degree of consensus.

Again, we can start with a similar argument for the experts. Lower consensus among expert evaluators of past editions can be expected to increase the strength of the signal originating from the sales performance of past editions. It could even be expected that the increase in strength, due to the variability of evaluations of past editions, may be greater with

regard to the experts than to the consumers. If expert evaluators are cautious about producing opinions that are less relevant to their audience, they will be even more likely to disregard other signals if they are not completely convincing, and instead pay full attention to sales of past editions. It is therefore hypothesized that:

H4b: The relationship of past sales with expert evaluations of the new edition of the product is moderated by the degree of consensus among expert evaluators of the past editions. The relationship is more positive if there is a lower degree of consensus.

3.3. Research method

3.3.1 The sample

To test the relationships of the peripheral signals to the evaluations of new editions, we benefit from online data repository that provides extensive performance records of creative products: vgchartz.com for the sales and metacritic.com for the evaluations. These online databases have also been used in earlier studies (e.g. Chen, Liu, and Zhang, 2012; Hennig-Thurau, Houston, and Heitjans, 2009; Zhu and Zhang, 2010).

The performance records belonging to 212 series released between 2000 and 2009, $n = 577$, have been collected from these websites. The dataset covers video games sequels released on all three major consoles, i.e. Nintendo Wii, Microsoft Xbox, and Sony PlayStations within the time period. The average number of editions per series in the sample is 3 (excluding the original), and the largest is 10: sporting games had the highest average number (6) of editions per series.

3.3.2 The operationalization of the variables

Expert Evaluations and *Consumer Evaluations* data are obtained from the Metacritic's (www.metacritic.com) database of video games, which has been used in many previous studies (c.f. Hennig-Thurau, Houston, and Heitjans, 2009; Plucker et al., 2009). For each type of evaluation, the average of past evaluations in the series is measured by averaging relevant average evaluation scores of past editions in the series. For example, the average consumer evaluation of past editions in the series is measured by averaging the average consumer evaluation scores per edition in the series before the focal product edition.

The *Lack of Consensus* denotes the variability of evaluations given by the evaluators of one community to each edition in the series. There are of course various way to measure variability, such as range, interquartile range, or mean difference. However, variance is the method of choice because it is the most commonly used measure of variability in the marketing literature (e.g. Dacin and Smith, 1994; Dwyer and Welsh, 1985). For each of the editions before product edition i in series j , the variance of the evaluation scores is measured and then the arithmetic mean of the calculated variances of each edition prior to the focal product is calculated, giving the measure of the past variability of the product evaluation.

$$Variability_{i,j} = \frac{1}{i-1} \cdot \sum_{n=1}^{i-1} [Var(Evaluation)_{n,j}]$$

Sales Performance data are obtained from the database of vgchartz.com. This website shows the number of legal copies sold worldwide. This approach makes sense because console gaming requires users to have the discs to play; so - assuming second hand re-sales and illegal copying are proportional to legal sales – the number of copies sold is a good indicator of the size of the user community. Just like the average of past evaluations, the average past sales are measured by calculating the average of worldwide sales of all editions in the series before the focal sequel. The average sales across past editions is used because

consumers may skip some releases in the series, therefore, the construct can capture the overall number of potential consumers of the new edition based on the overall sales performance of the series. A further benefit of this approach is that the sales figures do not have to be corrected for inflation or changes in the exchange rates. It is acknowledged that the sales measure excludes digital video game download, which is very common for the PC platform. However, this type of product distribution is nonexistent in the console platforms studied in this paper.

This study uses the change of video games genre, change of video game age rating, and change of product developer of the new edition, to control for possible attribute changes that may influence consumer or expert evaluations of the new editions. This study also controls for a range of variables, namely: platform manufacturer and how many editions there have been before the focal sequel.

3.4. Empirical results

3.4.1. Description of the Data

Table 3.1 presents the correlation matrix and the descriptive statistics of the variables used in this research. On average sequels in the sample received positive evaluations from both experts and critics, both evaluation scores average above 7 out of 10. On the contrary, it seems that expert evaluations ($\mu = 4.96$) display a larger variability than consumer evaluations ($\mu = 3.75$), even though there are fewer experts ($\mu = 24.65$) than consumers ($\mu = 44.71$) who evaluated the products in the dataset. This is an early indicator that there may be different dynamics at work in the two communities.

The results of the correlation analysis can be used as preliminary evidence to support the basis hypotheses. Already in this test, it is observed that evaluation scores of the new

editions are highly correlated with the respective community past evaluations on the series ($r = .269$, $p < .001$ for the consumers, $r = .319$, $p < .001$ for the experts). In addition, there is a significant and positive relationship between past sales and consumer evaluations ($r = .107$, $p < .05$) and unexpectedly an even stronger relationship with the expert evaluations ($r = .226$, $p < .001$). Most importantly, there is no correlation above .5 between the independent variables; therefore, the independence of the constructs is verified.

Table 3.1 Descriptive Statistics and Correlation Matrix

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Consumer Evaluations of the Sequel	7.814	1.491												
2 Expert Evaluations of the Sequel	7.437	1.257	.353***											
3 Average Consumer Evaluations of Past Editions (PE)	8.021	1.086	.269***	.085										
4 Average Variance of Consumer Evaluations of PE	3.746	4.145	.010	-.038	.057									
5 Average Quantity of Consumer Evaluators of PE	44.711	135.624	.127***	-.048	.121***	-.020								
6 Average Expert Evaluations of PE	7.198	2.150	.103*	.319***	.253***	-.015	.163***							
7 Average Variance of Expert Evaluations of PE	4.963	6.522	-.072	-.140***	-.152***	-.008	-.104**	-.224***						
8 Average Quantity of Expert Evaluators of PE	24.654	18.511	.143***	.171***	.280***	-.054	.463***	.193***	-.341***					
9 Average Sales of PE	1.638	1.836	.107*	.226***	.074	-.041	.536***	.277***	-.169***	.404***				
10 Number of Editions in the Series	3.459	3.789	-.144***	-.119***	-.080	-.055	-.088	-.221***	-.050	-.215***	.028			
11 Changes of Age Restriction (dummy)	0.098	0.297	.074	.110*	.089	-.019	-.015	.020	.040	.037	-.001	-.066		
12 Changes of Genre (dummy)	0.178	0.383	-.061	-.117***	-.105**	-.020	-.064	-.116**	.089	.012	-.001	-.138***	.019	
13 Changes of Developer (dummy)	0.161	0.368	-.070	-.116**	-.050	-.018	-.003	-.082	.062	-.064	-.054	.120***	-.025	.028

*** significant at < .001

** significant at <.01

* significant at <.05

3.4.2. Pre-test: endogeneity

Assuming that video games developers are profit seeking entities, they would discontinue unsuccessful product series and this may create endogeneity problems that need to be addressed. Ho *et al.* (2009) suggest a two stage equation system to tackle a similar endogeneity problem where they predict the effect of showing an advertisement (trailer) of a movie during the Super Bowl halftime break. They first predict the probability of airing a trailer and the estimated probability is used as a predictor in the main model. In a similar fashion, there could be several factors that influence management decisions to bring a new edition in a series to the market, including performance of past editions. To tackle this issue, we develop a probabilistic function that estimate the probability of sequel i being released to market based on instrumental variables. We use the market performance of only *one* edition immediately before the sequel i . Even if there is a series effect, the sales between editions can vary highly. Besides sales, market condition can vary across editions. For this we include Competition (COMP) as the next instrumental variable. This variable is measured by the number of other games released in the same year that have the same genre attribute. In addition, these control variables are also included in the probabilistic model: Multiplayer or Single player (MULTI), ESRB age restriction (Teen and Mature; Everyone is the default and excluded from the model), and Genre classifications (First Person Shooter (FPS), Racing, Role Playing Games (RPG), and Sports). The function is mathematically written as follows:

$$\begin{aligned} & \text{Probability}(\text{releasing a new sequel } i) \\ &= \Phi(\alpha_0 + \alpha_1 \cdot \text{SALES}_{i-1} + \alpha_2 \cdot \text{COMP}_{i-1} + \alpha_3 \cdot \text{MULTI}_{i-1} + \alpha_4 \cdot \text{TEEN}_{i-1} \\ &+ \alpha_5 \cdot \text{MATURE}_{i-1} + \alpha_6 \cdot \text{FPS}_{i-1} + \alpha_7 \cdot \text{RACING}_{i-1} + \alpha_8 \cdot \text{RPG}_{i-1} \\ &+ \alpha_9 \cdot \text{SPORTS}_{i-1} + \varepsilon_i) \end{aligned}$$

This model (and simpler models not using the Sales (i-1) variable, which resulted in similar results) is estimated using a probit function, and then the resulting probabilistic scores are included as an extra variable ($\hat{p}(\text{Sequel})_i$) in our main model as a predictor of the consumer

evaluation and expert evaluation of the sequel (Ho, Dhar, and Weinberg, 2009).

3.4.3. Test of hypotheses

The hypotheses are tested using a path model analysis with Maximum Likelihood Estimation using AMOS (Arbuckle, 2009). Mathematically, the model can be written as the followings^{3,4}:

$$\begin{aligned} ConsEval_i = & \alpha + \beta_1 AvgConsEvalPE_i + \beta_2 AvgExpertEvalPE_i + \beta_3 VarConsEvalPE_i \\ & + \beta_4 AvgSalesPE_i + \beta_5 AvgConsEvalPE * VarConsEvalPE_i \\ & + \beta_6 AvgSalesPE * VarConsEvalPE_i + \beta_7 AvgExpertEvalPE \\ & * VarConsEvalPE_i + \beta_8 ChangeAge_i + \beta_9 ChangeGenre_i \\ & + \beta_{10} ChangeDev_i + \beta_{11} NumberEdition_i + \beta_{12} Nintendo_i + \beta_{13} Sony_i \\ & + \beta_{14} ExpertEval_i + \beta_{15} \hat{p}(Sequel)_i + \varepsilon_i \end{aligned}$$

$$\begin{aligned} ExpertEval_i = & \gamma + \vartheta_1 AvgConsEvalPE_i + \vartheta_2 AvgExpertEvalPE_i \\ & + \vartheta_3 VarExpertEvalPE_i + \vartheta_4 AvgSalesPE_i + \vartheta_5 AvgExpertEvalPE \\ & * VarExpertEvalPE_i + \vartheta_6 AvgSalesPE * VarExpertEvalPE_i \\ & + \vartheta_7 AvgConsEvalPE * VarExpertEvalPE_i + \vartheta_8 ChangeAge_i \\ & + \vartheta_9 ChangeGenre_i + \vartheta_{10} ChangeDev_i + \vartheta_{11} NumberEdition_i \\ & + \vartheta_{12} Nintendo_i + \vartheta_{13} Sony_i + \vartheta_{14} \hat{p}(Sequel)_i + \omega_i \end{aligned}$$

The fit of the model is sufficiently high ($\chi^2=8.512$, $p = .385$, $RMSEA = .013$; $CFI = .981$; $GFI = .978$). The squared multiple correlations (R^2) of the dependent variables are .201 for consumer evaluation and .297 for expert evaluation. The results are reported in Table 3.2.

³ c.f. Byrne, 2000: 11

⁴ We also estimated a mixed model in which we allowed α and γ to vary across series. This takes into account the series-specific effects. The results, however, did not significantly differ from our AMOS results. We did not find significant variations of the intercept across series for the consumer model, i.e. the standard deviation of the intercept was 0. There was a slight variation in the intercept regarding expert evaluations across different series (the sigma of the intercept was .308(.082)), however, all the coefficients, significances and signs, were very similar. For example, the interaction between expert variability and sales was Coeff. = .140 (.013) in the mixed model, while it was Coeff. = .122(.010) in our original AMOS model.

Table 3.2 Standardized Path Coefficients

	β	Sig.	Hypothesized effect
Simple Effects			
Avg. Cons. Eval. Past Editions (PE) \rightarrow Cons. Eval. Sequel (S)	.219	<.001	+
Avg. Expert Eval. PE \rightarrow Expert Eval. S	.198	<.001	+
Avg. Expert Eval. PE \rightarrow Cons. Eval. S	.219	<.001	N/A
Avg. Cons. Eval. PE \rightarrow Expert Eval. S	.186	<.001	N/A
Avg. Sales PE \rightarrow Cons. Eval. S	.166	.003	+
Avg. Sales PE \rightarrow Expert Eval. S	.100	.038	+
Avg. Var. of Cons. Eval. PE \rightarrow Cons. Eval. S	-.095	.066	N/A
Avg. Var. of Expert Eval. PE \rightarrow Expert Eval. S	-.386	<.001	N/A
Interaction Effects			
Avg. Cons. Eval. PE * Avg. Var. of Cons. Eval. PE \rightarrow Cons. Eval. S	-.127	.008	-
Avg. Expert Eval. PE * Avg. Var. of Expert Eval. PE \rightarrow Expert Eval. S	-.144	.005	-
Avg. Expert Eval. PE * Avg. Var. of Cons. Eval. PE \rightarrow Cons. Eval. S	.021	.705	N/A
Avg. Sales PE * Avg. Var. of Cons. Eval. PE \rightarrow Cons. Eval. S	.102	.043	+
Avg. Cons. Eval. PE * Avg. Var. of Expert Eval. PE \rightarrow Expert Eval. S	.038	.309	N/A
Avg. Sales PE * Avg. Var. of Expert Eval. PE \rightarrow Expert Eval. S	.122	.010	+

Sig. levels are two tailed

The results of the analysis of our model suggest that consumer evaluations of the new editions are positively related to the average consumer evaluations across past editions ($\beta = .219$, $p < .001$), average expert evaluation across past editions ($\beta = .219$, $p < .001$), and average sales across past editions ($\beta = .166$, $p < .01$). The positive relationship of the average past consumer evaluation is significantly lowered ($\beta = -.127$, $p < .01$) by the lack of consensus between consumers. This relationship is visualized in Figure 3.2. We also find evidence to suggest that the positive relationship of average past sales can be increased by the lack of consumer consensus ($\beta = .102$, $p < .05$), which is reflected by Figure 3.3. These results offer support for H1a, H2a, H3a, and H4a.

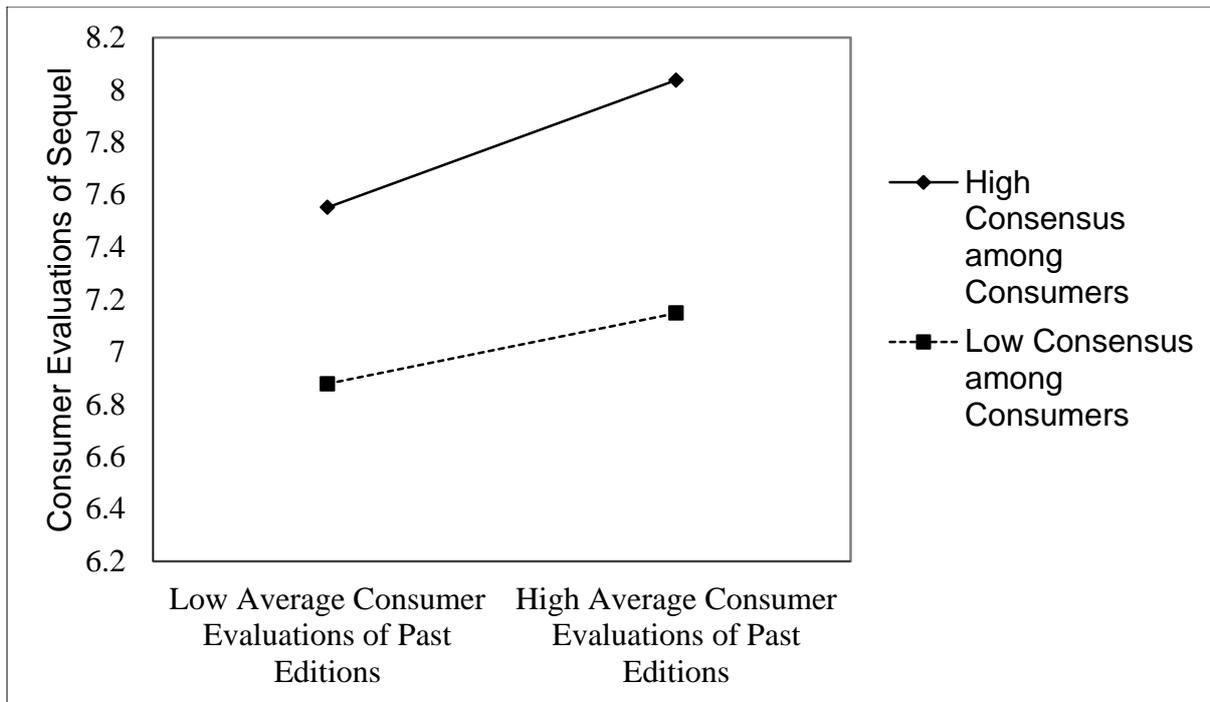


Figure 3.2 The effect of consumer evaluations of past editions on consumer evaluations of the product upgrade with low or high variability of consumer evaluations

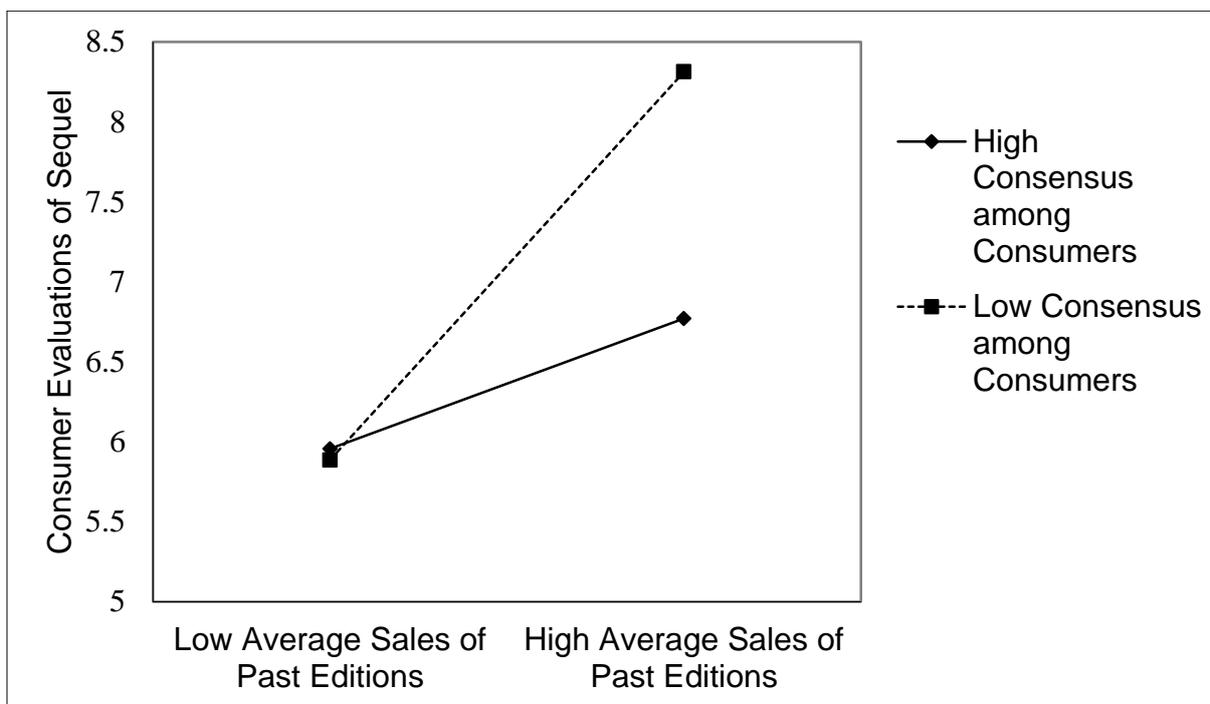


Figure 3.3 The effect of sales of past editions on consumer evaluations of the product upgrade with low or high variability of consumer evaluations

The results also provide strong evidence that expert evaluations of the new editions

are highly affected by average expert evaluations across past editions ($\beta = .198, p < .001$) and average sales across past editions ($\beta = .100, p < .001$). Besides that, we also find significant cross-over relationships, i.e. relationship of average consumer evaluations across past editions with expert evaluations of the new edition ($\beta = .186, p < .001$). The positive effect of past expert evaluations across editions is significantly lowered ($\beta = -.144, p < .01$) by the lack of consensus between the experts (visualized in Figure 3.4). Furthermore, we find strong evidence that effect size of past sales is more positive when there was lack of consensus among experts ($\beta = .122, p < .05$). This amplifying effect is visualized in Figure 4. With the previously mentioned results, H1b, H2b, H3b, and H4b are also supported.

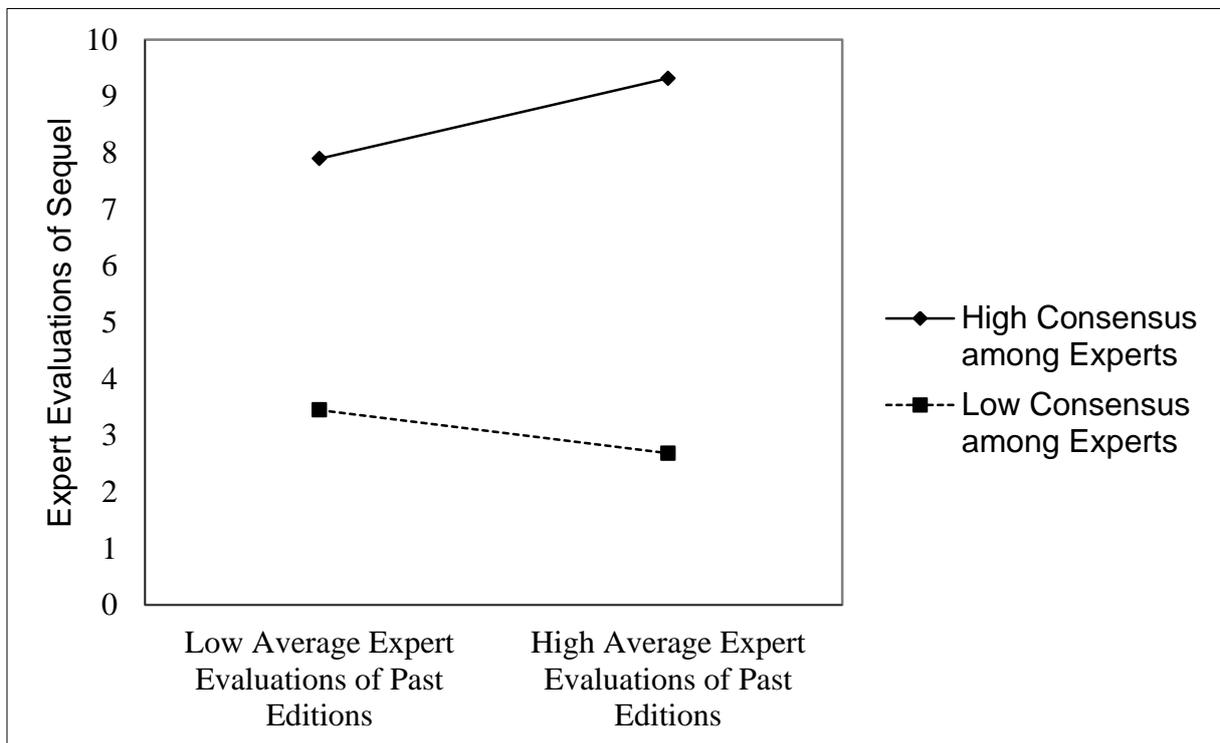


Figure 3.4 The effect of expert evaluations of past editions on expert evaluations of the product upgrade with low or high variability of expert evaluations

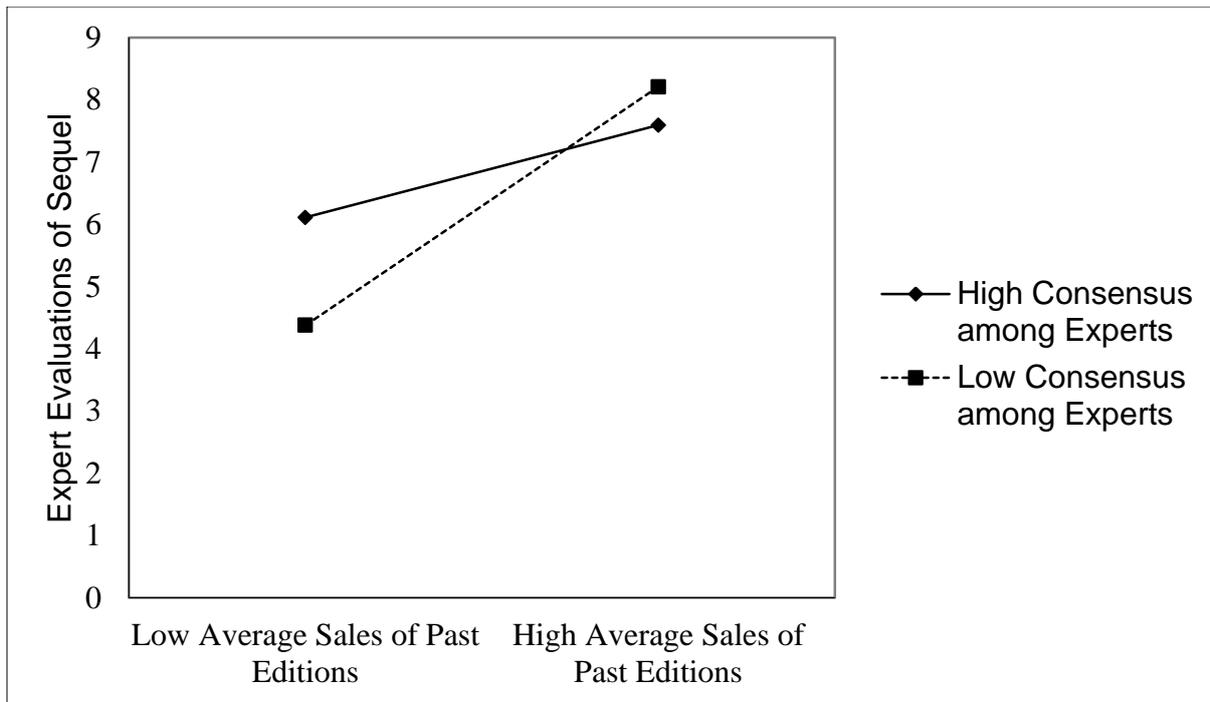


Figure 3.5 The effect of sales of past editions on expert evaluations of the product upgrade with low and high variability of expert evaluations

Consistent with the results of earlier studies on sequels, we found a negative effect of the number of editions in the series on product evaluation (for consumers $\beta = -.111$, $p < .01$, and for experts $\beta = -.109$, $p < .01$). The default platform during the model estimation is Microsoft Xbox games. There are no significant differences between the evaluations of sequels of Xbox and of Nintendo games by experts ($\beta = .003$, $p > .1$) or consumers ($\beta = .011$, $p > .1$). Experts evaluations are not significantly different for PlayStation games ($\beta = .052$, $p > .1$), though consumer evaluations are somewhat higher ($\beta = .139$, $p < .001$). Regarding the effect of changes of core product attributes, surprisingly, only 'change of genre' results in a significant effect on new product edition evaluations, and this effect is only limited to expert evaluations ($\beta = -.113$, $p < .01$). The significance level of the other control variables is higher than .10, suggesting that their impact on the expert and consumer evaluations is negligible.

3.4.4. Robustness tests

It may be difficult to comply with the multivariate normality assumption if one uses a dataset from the creative industry. For example, Hu, Pavlou, and Zhang (2006) showed that online book reviews are negatively skewed, which violates the standard normal distribution assumption of a dependent variable, and argued that this is because consumers' main motivation to write an online review is because of their satisfaction with the product. Similar to the findings in earlier studies, consumers evaluations in the sample used in this study are also skewed to the same direction (skewedness = -6.970). To deal with this deviation from the normality assumption, bootstrap resampling is performed to create a much larger sample and correct the bias of standard errors of the estimates (Arbuckle, 2009; Nevitt and Hancock, 2001). The bootstrap estimation is based on ML method with 2,000 times resampling. Similar significance levels of the estimates were reported for every coefficient, confirming the results that were presented in the main analysis.

We performed a 3SLS as an alternative simultaneous estimation procedure to estimate the determinants of evaluations. We choose 3SLS as an alternative because similar to AMOS Path Modeling that we adopted in our main analysis, 3SLS is a form of statistical model that simultaneously estimate a set of linear equations (Greene, 2003). The results are presented in Table 3.3. and they are very similar to the initial findings. The 3SLS Multiple R-squares are .230 and .254 respectively for the consumers and experts evaluations equations. Another way to test the robustness of the findings is by using a different way of measuring the variables tested in the model. As an alternative, this study follows the methodology implemented by Hennig-Thurau, Houston and Heitjans (2009) which used the performance of the edition immediately before the focal edition as the determinant of performance. Thus, instead of past sales, past evaluation scores, and the lack of consensus in past evaluations over the whole series of past editions, we can look only at these variables with regard to the

last edition before the focal one. The same model is estimated with the new variables, and the results (also presented in Table 3) show that most of the relationships are similar.

Table 3.3 Robustness test applying alternative methodologies of estimation

	3SLS (all past editions before the product upgrade)		AMOS (but only 1 edition before the product upgrade)	
	B	Sig.	β	Sig.
Simple Effects				
Avg. Cons. Eval. Past Editions (PE) → Cons. Eval. Sequel (S)	.357	<.001	.181	<.001
Avg. Expert Eval. PE → Expert Eval. S	.381	<.001	.261	<.001
Avg. Expert Eval. PE → Cons. Eval. S	.071	.218	.008	.883
Avg. Cons. Eval. PE → Expert Eval. S	.138	.008	.071	.164
Avg. Sales PE → Cons. Eval. S	.106	.052	.136	.004
Avg. Sales PE → Expert Eval. S	.119	.001	.182	.001
Avg. Var. of Cons. Eval. PE → Cons. Eval. S	-.005	.489	-.022	.710
Avg. Var. of Expert Eval. PE → Expert Eval. S	-.096	.002	-.432	<.001
Interaction Effects				
Avg. Cons. Eval. PE * Avg. Var. of Cons. Eval. PE → Cons. Eval. S	-.164	.006	-.109	.036
Avg. Expert Eval. PE * Avg. Var. of Expert Eval. PE → Expert Eval. S	-.334	<.001	-.165	.017
Avg. Expert Eval. PE * Avg. Var. of Cons. Eval. PE → Cons. Eval. S	.010	.459	.039	.471
Avg. Sales PE * Avg. Var. of Cons. Eval. PE → Cons. Eval. S	.005	.891	.014	.794
Avg. Cons. Eval. PE * Avg. Var. of Expert Eval. PE → Expert Eval. S	.027	.702	.018	.763
Avg. Sales PE * Avg. Var. of Expert Eval. PE → Expert Eval. S	.098	.017	.053	.244

Sig. levels are two tailed

Next, instead of using the evaluation scores, the number of consumers or experts who evaluate the products is used as an alternative measure of interest by consumers and experts (c.f. Gemser, van Oostrum and Leenders, 2007). Nevertheless, this study can find support for most of the effects presented in the main results. The number of reviewers of the new editions are highly affected by the average number of reviewers of the past editions (for consumers $\beta = .275$, $p < .001$, for experts $\beta = .577$, $p < .001$), and these effects are mitigated by the lack of consensus in the respective communities (for consumers $\beta = -.258$, $p < .001$, for experts $\beta = -$

.485, $p < .001$). However, there is no significant effect of past sales on the number of consumer evaluations of new editions ($\beta = .064$, $p = .214$) or on the number of expert evaluations ($\beta = .062$, $p = .199$). It seems likely that, because of strong relationship between sales and number of evaluators, the effects of the past sales are absorbed in the effects of the number of past evaluators. Interestingly, the explanatory powers of the model (R^2) also increase ($R^2 = .306$ for consumers and $R^2 = .386$ for experts).

As an alternative to the average variability among evaluation scores within the editions, the variability of the average evaluations across editions is used to measure the lack of consensus, please refer to the following formula:

$$\text{Variability_Alternative}_{i,j} = \text{Var}[\text{Mean}(\text{Evaluation})_{0\dots i-1,j}]$$

Arguably, the two are conceptually different factors; the first measures the degree of the lack of consensus about a single object of evaluation in a community of evaluators, while the latter measures the fluctuation of perceived product quality across editions in a series. However, both variables signal uncertainty about product quality (c.f. Dacin and Smith, 1994; Volckner and Sattler, 2006; West and Broniarczyk, 1998). Therefore, the same model is re-estimated with the alternative operationalization of variability and similar results were found. The hypothesized role of variability of past evaluations that mitigates the effect of past evaluations on new edition's evaluations persists, both in the case of consumers ($\beta = -.178$, $p < .001$) and of experts ($\beta = -.143$, $p < .001$). The results from this analysis do not support the hypothesis about the role of past sales as alternative signal for consumers when there is a high variability of evaluations ($\beta = .096$, $p = .102$). Nevertheless, this effect is still significant with regard to the experts ($\beta = .116$, $p < .05$).

3.5. Discussion

The concept of the carry over effect of product quality perception from one edition to the other has been discussed in the literature (e.g. Keller, 1993; Hennig-Thurau, Houston, Heitjans, 2009). However, past studies have not yet explored how this effect occurs. Our research is the first study that empirically explores the connection between the evaluations of one edition and the next editions. In other words, this study helps to open up the black box of the carry-over, by showing how the performance of past editions affects the evaluations of the focal edition.

The findings show that both consumers and experts are influenced by evaluations of past editions by their respective communities. This result may seem to be in contradiction with Anderson's (1973) and Oliver's (2009) papers that suggest original product's success leads to too high expectations for the sequel, eventually leading to lower satisfaction. In our study, we also find decreasing average valence of evaluation scores between original editions and the new editions, but even then, the scores are still not far apart. For example, the original *God of War* video game received a score of 94 from the critics, the sequel *God of War 2* received a score of 93, and the next sequel *God of War 3* received a score of 92. Table 3.4 presents various product editions and their evaluation scores. In the example one can see that the evaluation scores for each edition hover around the average of the series' evaluation. Studies should therefore focus more on identifying the factors that have an impact on the continuities that appear in the evaluation of series of product editions.

Table 3.4 Examples of Consumer and Expert Evaluations across Editions

Series Name	Installment #	Consumer Evaluations	Expert Evaluations
God of War	1	9	9.4
	2	8.8	9.3
	3	8.6	9.2
Battlefield	1	8.3	8.3
	2	8.2	9.1
	3	7.5	8.5
Fifa Soccer	1('06)	7.9	8
	2('07)	7.3	8.2
	3('08)	7.8	8.1
	4('09)	7.9	8.7
	5('10)	7.8	9.1
	6('11)	8.2	8.9
	8('12)	7.3	9
	Harry Potter (movie)	1	7.2	6.4
	2	5.8	7.3
	3	7.1	8.2
	4	7.8	8.1
	5	6.9	7.1
	6	6.8	7.8
	7(1st half)	7.5	6.5
	7(2nd half)	7.8	8.7

As a first step to accomplish this, this study looked at the lack of consensus among evaluators within particular communities of evaluators and presented arguments how this could operate as a signal amplifier. Past studies have mainly focused on the average of the evaluations but they largely ignored the extent of (dis-)agreement between the evaluators, and there is a call for more studies that investigate how variability in evaluations can have an effect towards the consumers (Sun, 2012). We answer this call by investigating not only the effect of lack of consensus with regard to the consumer evaluations but also with regard to the evaluations of the experts. We discuss and provide empirical evidence which shows how a lack of consensus, either in the expert or consumer communities can weaken the transferability of the communities' appreciations from one edition to the next. Considering the results that we have found, we would like to suggest that future studies should consider

looking at the level of consensus both among consumers and among expert critics when discussing new product performance, and especially if it concerns products that can be seen as part of a series.

This study also answers the call for more studies that examine the differences between experts and consumers (Zhu and Zhang, 2010). In earlier studies, evaluations by experts received most of the attention, also because these were more readily available and visible. Before the spread of broadband internet there were very limited options for consumers to publicly express their product evaluations. Apart from studies of WOM (e.g. Liu, 2006) there have been relatively few empirical papers that explore consumer reviews (Zhu and Zhang, 2010). It is also not uncommon that expert and consumer reviews are combined into one construct (e.g. Hennig-Thurau, Houston, and Heitjans, 2009). We find differences between expert and consumer evaluations and their ability to cross-influence evaluations. Interestingly, when testing a mixed model as suggested by one of the anonymous reviewers, we found that the intercept of the consumer evaluation model did not vary across series, but that it did vary for expert evaluation. This signals that on average consumers do not treat products from different series in different ways, but experts do. These results justify future research that will distinguish systematically between the two types of evaluations, each with specific antecedents and consequences. This will be possible as new editions are added to existing series, resulting in more observations per series.

Finally, as a minor finding, this study shows that experts may not be as objective as they are sometimes assumed to be. Future research should take into account that experts may be affected by how they see the consumers reacting to the product or franchise, by observing consumer reviews or sales. The desire to maximize profit by the media that employ them can force experts to heed the market (Shoemaker and Vos, 2009), but more independent experts may also fear to lose relevance to their readers if their opinions drift too far away from the

average consumer's. Research on reviews usually assumes a unidirectional causality, i.e. from the expert reviews on the behavior of the consumers, and overlooked the possibility that the evaluations of experts should be considered to be partly endogenous. The approach to analyze evaluations across editions gives an opportunity to explore how past market performance can influence future expert judgments, which suggests a two way relationship between the market and the expert.

The results of this study suggest a number of managerial implications. The exploration of the determinants of evaluations serves to better understand and predict whether the popularity of a franchise warrants another edition. Another important implication is that producers of goods that are produced in series should not take mediocre expert reviews too much into account if consumer reviews and sales are good, because there is a good probability that the experts will revise their opinions in respect of later editions without the producers making additional efforts or costs to satisfy their preferences. However, if the earlier versions have not been too popular among consumers it does make more sense to also attempt to turn the expert reviewers around.

This paper has several limitations. First, the dataset used in the analysis is based on numerical evaluation scores submitted by consumers and experts. Future studies may also employ textual data mining tools that can generate evaluation scores based on the content of the evaluations. Such tools can also generate more robust measures of community consensus based on the dissimilarities of the wording and not just the variance of the scores. However, such an analysis would require a very large database and a powerful computation algorithm because the number of texts to be analyzed can reach hundreds, if not thousands, from each type of evaluator, for each edition. This study is based on a dataset from the video games industry, using inputs from aggregator websites. These websites are less readily available outside of the creative industries, but, newer data-mining tools will allow much wider ranging

explorations of un-aggregated evaluations on the internet, that are on individual blogs, forums, social network sites, or other online type of (online) communities. Future research will be able to capitalize on these developments and identify patterns, as well as study in depth the degree of consensus within and between different communities of evaluators. Additionally, the evaluations in the dataset used in this study only have a single dimension. It is not uncommon that consumers and experts provide their evaluations in respect to several dimensions, for example, product enjoyment, ease of use, utility, artistic value. Future research that would include multiple dimensions along which evaluations are scored could further explore the extent to which scores along particular dimensions of past editions have an effect on scores along the same or different dimensions in the evaluations of the new edition. Further studies that extend the approach followed by this study to other industries may also have to include more or other industry-specific signals that may affect the carry-over from one edition to the next. For example, in analyzing signals in the movie industry, it is important to control for star power (Ravid, 1999). This study does control for possible changes of developer between the editions. This study finds this factor is insignificant, but this may be due to the relatively low importance of software developers, programmers, or project directors as "stars" whose name carries enough reputational value to influence experts and consumers' judgment in the video games industry, future studies that extend our model but based on other industry, e.g. the movie industry, may find this factor significant. The study is limited to new editions, without taking into account possible spinoffs of the franchise. For example, after the success of the book series, the Harry Potter franchise created millions of dollars revenue from movie productions and video games. Future studies may investigate how expert and consumers evaluations can be transferred not only to the next edition of the series, but also to extensions in other media.

4. Pushing the boundaries: Determinants of exploration in the video game industry⁵

Abstract

This study examines how trends and variability of past performance predicts organizations' tendency to engage in explorative behavior. The empirical setting is the video game industry. The data refer to 5312 video games from 362 video games developers released in the period between 2000 and 2009. The study finds that a positive trend in performance decreases the likelihood of exploration. This confirms literature that suggests that organizations avoid risk-taking behavior if there is no immediate need. A high variability of past performance increases the probability of organizations to engage in exploratory behavior. By means of exploration, organizations can offset the uncertainty created by high variability in performance. Competitive intensity attenuates the effects of positive performance trends on explorative behavior and intensifies the effects of high variability. The study discusses the theoretical and managerial implications of the findings.

Keywords: Exploration, Performance feedback, Video Games Industry

4.1. Introduction

Organizations have to choose whether they explore new opportunities, exploit their current business or do both. Through exploration, firms can respond to environmental changes and thus ensure future viability (Danneels, 2002; Geroski, Machin, and Van Reenen, 1993; Levinthal and March 1993; March 1991). However, exploration also has a downside since exploration entails activities that embody higher risks (Gupta, Smith, and Shalley, 2006; March, 1991; Voss, Sirdeshmukh, and Voss, 2008). Exploitation, on the other hand, refers to the use and further development of existing knowledge and competences (Danneels, 2002). Returns from exploitation are more proximate and predictable, ensuring a company's current rather than future viability (Benner and Tushman, 2003; Danneels, 2002).

To explain why companies are willing to take the risk of exploration, March (1991) argues that companies have a greater stimulus to search for alternatives (i.e. exploration) "if

⁵ This chapter has been submitted to the Journal of Product Innovation Management. Currently waiting for reviewer comments.

the most preferred known alternative is below the target" (March, 1991: 72). This line of argument suggests that the performance level of the organization is an important rationale or motive for exploration. However, to date, existing literature on exploitation and exploration pays scant attention to performance as an antecedent of explorative and exploitative behavior. Instead, this literature mainly considers the effects of exploration on performance. This paper revisits the argument of March (1991), examining past performance as a determinant of explorative behavior. To do so, this paper examines the influence of performance trends (the general tendency of the changes in performance over time) and variability (the measure of dispersion or instability of performance over time). A dynamic view on performance provides richer information than when focusing on average performance figures alone.

Existing literature on ambidextrous organizations, that is, organizations that engage in both explorative and exploitative behavior, argues that the availability of resources stimulates firms to both explore and exploit (Raisch and Birkinshaw, 2008). However, organization literature suggests that firms tend to avoid risk-taking behavior including exploration, particularly in the case of lack of compelling reasons to do so (Audia and Greve, 2006; Danneels and Sethi, 2010; Lehman and Hahn, 2012).

Next to examining whether a positive performance trend impedes or stimulates explorative behavior of firms, this paper examines the influence of variability of performance on exploratory behavior. Variability of performance creates uncertainty and risks. If this variability results from current activities - and therefore exploitation would only exacerbate this situation-, organizations can attempt to offset this by means of exploration, even though exploration in itself is also uncertain and risky.

Prior research suggests that the competitive environment of an organization influences the strength of the relationship between exploration/exploitation and performance (Calantone, Yeniyurt, Townsend, and Schmidt, 2010; Jansen, Bosch, and Volberda, 2006; Voss et al.,

2008). A high degree of competition in general results in lower performance due to competition for resources (Singh, 1986) and pressure to reduce cost (Matusik and Hill, 1998). This study also looks at competitive intensity as a moderator of the main relationships, positing that intense competition will weaken the effects of a positive performance trend on explorative behavior and strengthens the effects of performance variability on explorative behavior.

Exploration can be a result of: (1) developing new technology, (2) entering a new market segment, or a combination of both (Abernathy and Clark, 1985; Benner and Tushman, 2003). In this paper, the focus is on technology-driven firms that develop new technological products for market segments they do not yet serve. Exploring new customers, as opposed to exploiting an existing customer base, requires a proactive market approach (Danneels, 2002), which may be quite challenging, particularly for technology-driven firms. In technology-driven firms, technology exploitation and exploration is, in general, an ingrained part of ongoing business and often necessary for organizational survival (Gilsing and Nootboom, 2006). Unlike new technology exploration, new market exploration on the other hand is not always necessary for the survival of technology-driven firms and thus can be seen as true risk-taking behavior.

The specific empirical setting for this research on performance and explorative behavior is the video game industry. Video game developers are technology-driven since they have to update their game source code and development techniques continuously to adapt to the new technologies in the console graphical and music processors, operating systems, and new user interfaces (Schilling, 2003). Indeed, video game developers often distinguish themselves not by means of technology from the competition, but through non-technological factors such as graphics, storytelling, world building and leveling (Koster, 2010). When video game developers explore new market segments, they in general do so by means of exploring

new video game genres, as particular groups of consumers who constitute specific market segments, tend to buy video games of particular genres (Greenberg, Sherry, Lachlan, Lucas, and Holmstrom, 2010). Serving new consumers by expanding into new video game genres is a type of explorative behavior that is relatively easy to observe. Furthermore objective performance data on video game developers is in the public domain. These factors make the video game industry an excellent empirical setting for this research on determinants of explorative behavior.

The next two parts of the paper present the theoretical framework and the method. Then, a description of the results will be given and the paper concludes with providing implications for both theory and practice and discussing the limitations of the research.

4.2. Theoretical framework

4.2.1. A model for exploratory behavior

Based on a review of the literature, Raisch and Birkinshaw (2008) provide a framework that covers antecedents, moderators and outcomes of explorative and exploitative firm behavior. According to this framework, organizational structure, context, and leadership are important organizational antecedents. In their model, Raisch and Birkinshaw (2008) include performance as an outcome variable rather than an antecedent - as this paper does. Their model does include resource endowments, but as a contingency factor that influences firms' tendency to engage in exploitative and explorative behavior. More specific, based on prior literature, they suggest that firms' ability to engage in both explorative and exploitative behavior "may be contingent on the availability of sufficient resources" (Raish and Birkinshaw, 2008: 395).

Figure 1 presents the model that guides this study. Instead of using performance as the outcome of exploration, the model considers performance as a determinant of explorative

behavior. The model makes a distinction between performance trend and performance variability. Financial analysts employ both of these constructs to predict future performance (Bondt, 1993). These two constructs have different functions; variability serves to inform investors about the instability of performance, while trend provides information about the tendency of performance movement into a specific direction over time (Bondt, 1993). Analogously to the literature about stock market investment decisions, this paper will show how performance in terms of trend and variability determines organizational exploratory decisions.

In addition to trends in and variability of performance as determinants of explorative behavior, the model includes competitive dynamics as a moderating variable. The expectation is that competitive intensity will create a perception of threat, and as threat increases, organizations should be more willing to risk and invest on exploration (Voss et al., 2008). The next two sections provide arguments for the relationships shown in Figure 4.1.

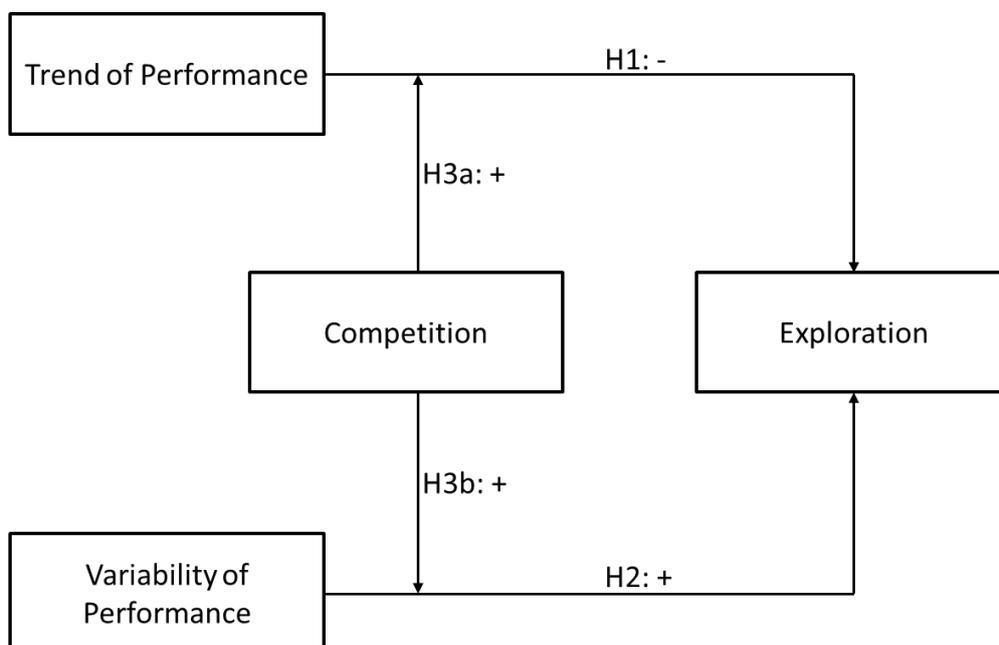


Figure 4.1 Conceptual Model

4.2.2. Trends in past performance and explorative behavior

Literature on organizational ambidexterity tends to study performance in terms of outcomes rather than in terms of antecedents. Studies on the relationship between resource endowments and exploration and exploitation examine how stocks of resources accumulated over time, influence explorative or exploitative behavior or how the simultaneous pursuit of both exploration and exploitation influences stocks of resources (e.g., Ebben and Johnson, 2005; Jansen et al., 2006; Voss et al., 2008). One of the few studies that examine more in-depth how patterns of past performance affect explorative and exploitative behavior is of Lubatkin, Simsek, Ling, and Veiga (2011). In their study, Lubatkin et al. (2011) examine how companies' performance of one year prior (t-1) influences the ambidextrous orientation of SMEs in the subsequent period (t) and find there is no significant relationship. In a similar vein, Wu and Shanley (2009) find that in the US electromedical device industry, firm performance (measured in terms of return on assets) has no significant effect on firms' attempts to explore new knowledge.

Exploration is a risky decision because it involves the development of new technological or marketing trajectories for which returns are unclear, uncertain, and remote in time (Danneels, 2002). Similar to March (1991), other studies in the field of organization theory (e.g., Bazerman, 1984; Audia and Greve, 2006; Daneels and Sethi, 2010; Lehman and Hahn, 2012; Singh, 1986) argue that in particular underperforming entities are likely to engage in risk taking behavior. Singh (1986) for example, finds that organizations with above satisficing performance avoid risky decisions to maintain the status quo and ensure a similar level of satisfying performance in the future. Organizations that lack satisfying performance, on the other hand, tend to take risky decisions in hope to get a better return (Singh, 1986). In their study on nonprofit professional theatre companies, Voss et al (2008) find that having a

high number of consumer subscriptions, reduces the theatre group's tendency to explore and take risks by means of new theatre plays and challenging artistic boundaries. Lehman and Hahn (2012) find evidence that the likelihood of risk taking among National Football League teams increases when performance is below the aspiration level.

Exploration may open up new opportunities that can strengthen an organization's position (Miller, Lant, Milliken, and Korn, 1996). However, similar to the reasoning on slack resources and organizational ambidexterity, some studies suggest that in favorable conditions, decision makers tend to engage in risk taking actions (e.g., Staw, Sandelands, and Dutton, 1981; Osborne and Jackson, 1988). In a recent study, Neill and York (2012) find that when managers view situations as favorable due to, for example, market growth, they tend to use more explorative strategies. On the other hand, they also find that when managers perceive the effects of actions as uncontrollable, uncertain or unpredictable, they tend to avoid explorative behavior. Considering these results and evidence that exploration is in general a high-risk strategy (Gupta et al., 2006), this paper predicts a negative effect between a positive performance trend and exploration:

H1. *A positive performance trend is negatively associated with the extent to which organizations engage in explorative behavior.*

4.2.3. Variability of past performance and explorative behavior

The conceptual model suggests that, next to performance trends, the distribution of performance changes –that is, variability –across products within an organization will affect the degree to which organizations engage in explorative behavior. Das and Chen (2007) find that a lack of consistency of stockbrokers' opinion over time has a detrimental effect on stock prices. Varying opinions among stockbrokers create an ambiguous and uncertain view towards the capability of a particular traded stock/commodity to yield favorable return. Such

uncertainty negatively affects the sentiment that the stockbrokers have towards that particular share and indirectly their investment decisions with regard to these shares.

When performance is unpredictable and changing constantly, organizations will be likely to adopt diversification strategies to reduce this uncertainty (Bettis and Hall, 1982; Shi, 2004). One strategic option firms can use is to expand, change, or diversify their product portfolio (Shi, 2004). For example, large movie studios tend to co-finance various movie projects at the same time to mitigate risks since performance outcomes of their movies are highly uncertain (Goettler and Leslie, 2005). Another option is to diversify operations by entering a different market segment to reduce demand risk (Kim, Hwang, and Burgers, 1993; Shi, 2004). The study of Kim et al. (1983) of 152 multinational organizations shows how targeting different nations can offset risk and increase the return of investment as the practice reduces the risk exposure as well as offering different investment opportunities.

In sum, prior literature on variability suggests that high variability in performance creates uncertainty. Organizations can reduce this uncertainty by means of developing new products and markets that eventually can provide for a more consistent stream of revenues. Developing new products and markets is, however, also fraught with risk. Thus, when performance variability is high, firms will tend to engage more often in explorative behavior.

H2. A high level of performance variability is positively associated with the extent to which organizations engage in explorative behavior.

4.2.4. The moderating role of competition

Studies on organizational ambidexterity suggest that competitive intensity is an important moderating factor influencing the relationship between exploration/exploitation and firm performance (Levinthal and March, 1993; Lewin, Long, and Carroll, 1999; Auh and Menguc, 2005; Jansen et al., 2006). Empirical results are, however, not clear-cut. Jansen et al (2006)

for example hypothesize that, because intense competition usually reduces available resources for exploration, intense competition negatively moderates the relationship between exploration and financial performance. However, in their study of explorative and exploitative behavior of business units of a large European financial services firm, they do not find support for this prediction. To explain this finding, Jansen et al. (2006) point out that, if intense competitive rivalry is long-term, "[t]he only way to refrain from decreasing margins may be to develop radically new products and services for emerging markets or customers." (Jansen et al., 2006: 167).

Studies on industry dynamics and innovation suggest that the degree to which firms innovate is contingent to the degree of competition within an industry (e.g. Geroski, 1994). In highly competitive environments, innovation (i.e. exploration) can offer firms a possibility to escape intensive pressures for higher efficiency and lower prices (Matusik and Hill, 1998). Thus, in environments in which competition is intense, the tendency of firms to engage in explorative behavior may be higher, since this type of behavior can help the organization to escape competitive pressure (Abebe and Angriawan, 2013). This tendency may be more strongly present if organizations have a record of positive past performance, since this will ensure that organizations have sufficient slack resources for explorative innovations. In a similar vein, the urgency for organizations with relative unstable performance outcomes to engage in explorative behavior will even be higher in the case of intense rivalry. They will, however, have less organizational slack than those with a more consistent positive performance track record. Considering the urgency to pursue explorative behavior for long-term viability, they still will have to engage in this behavior.

H3a. *Competitive intensity attenuates the negative relationship between a positive performance trend and the extent to which organizations engage in explorative behavior.*

H3b. *Competitive intensity intensifies the positive relationship between a high level of performance variability and the extent to which organizations engage in explorative behavior.*

4.3. Method

4.3.1. Data and sample

This study uses data from the console video game industry. One of the means to compete in this industry is by the continuous introduction of new video games titles (Williams, 2002). The development of new console video games, however, requires increasing amounts of resources due to sound-, graphical-, and programming complexities. For example, currently new video games for consoles require development budgets of US\$ 3 to 10 million on average (Edwards, 2005).

The data for this study comprises of 5312 video games from 362 video games developers ($n = 362$), released between April 2001 and March 2010 on all major consoles (PS2, PS3, Wii, Xbox, Xbox 360). Video game developers release most of their new games during the second quarter of the year, which coincides with the July and August school holiday season or during the fourth quarter of the year, which coincides with the Thanksgiving-Christmas holiday season. Video games producers' financial year therefore begins at the 1st of April every year instead of the normal calendar year. Using 31 March as the end of the financial reporting year thus better reflects video game developers' annual performance cycle. The study uses Metacritic.com for the name of the developers responsible for the games, game release date, and genres of the games (Arsenault, 2009).

In the video game industry, genre is an important means of classification and examples of popular video game genres are action, racing, or first person shooter games.

Video games of a certain genre share common attributes such as plot similarities, similar visuals, and rules. These common attributes form the basis for audiences' expectations, unique for the genre (Hsu, 2006). Consumers who prefer certain genres of video games often share the same characteristics in terms of gender, personal traits, and personal motives for playing the games (Greenberg et al., 2010). Similar to creative industries such as film and music (Altman, 1999; Schatz, 1981), in the video game industry, genres represent specific market segments (Gartenberg, 2004; Prugsamatz, Lowe, and Alpert, 2010). Video game producers who explore by adding new genres to their product portfolio thus often enter into new market segments by doing so. Organizations' exploration into new genres requires them to understand the needs and preferences of consumers that favor this type of genre.

4.3.2. Model Specification

This study estimates the occurrence of explorative behaviors by organizations. The outcome variable is a binary variable that captures whether organizations explore new genres or not. Given the nature of the dependent variable a binary logistic estimation method is adopted (c.f. Chang, Kao, Kuo, and Chiu, 2012; Larimo, 2003). Similar to other types of regression analysis, the main function in a logistic regression makes use of one or more predictor variables. However, unlike OLS, the logistic method uses a logistic function to accommodate the binary outcomes of the dependent variable (treating the dependent variable as the outcome of a Bernoulli trial).

The main function in our study is a function of the trend and variability in performance, competitive intensity, the number of video game titles already produced, and average past performance (Equation 1). Mathematically the function can be written as follows:

$$\begin{aligned}
 f(x_{i,\hat{t}}) = & \beta_0 + \beta_1 \text{Trend ConsEval}_{i,t} + \beta_2 \text{Trend ExpertEval}_{i,t} + \beta_3 \text{Trend Sales}_{i,t} \\
 & + \beta_4 \text{Var ConsEval}_{i,t} + \beta_5 \text{Var ExpertEval}_{i,t} + \beta_6 \text{Var Sales}_{i,t} + \beta_7 \text{Nr. Games}_{i,t} \\
 & + \beta_8 \text{Competition}_{i,t} + \beta_9 \text{Avg ConsEval}_{i,t} + \beta_{10} \text{Avg ExpertEval}_{i,t} \\
 & + \beta_{11} \text{Avg Sales}_{i,t} + \beta_{12} \text{Trend ConsEval}_{i,t} * \text{Competition}_{i,t} \\
 & + \beta_{13} \text{Trend ExpertEval}_{i,t} * \text{Competition}_{i,t} + \beta_{14} \text{Trend Sales}_{i,t} \\
 & * \text{Competition}_{i,t} + \beta_{15} \text{Var ConsEval}_{i,t} * \text{Competition}_{i,t} + \beta_{16} \text{Var ExpertEval}_{i,t} \\
 & * \text{Competition}_{i,t} + \beta_{17} \text{Var Sales}_{i,t} * \text{Competition}_{i,t} + \varepsilon
 \end{aligned}$$

$$p(\text{Expansion}_{i,\hat{t}}) = \frac{e^{f(x_{i,\hat{t}})}}{1 + e^{f(x_{i,\hat{t}})}}$$

The second equation is the logistic function that embeds the main function specified in first equation, where $p(\text{Expansion})$ is the probability that an organization extends operations to at least one new genre. Table 4.1 provides an overview of the variable names and gives short descriptions. The next section gives a more in-depth description of the variables and their measurement.

Table 4.1 Overview of the variables

Variable name	Description
$p(\text{Expansion}_{i,\hat{t}})$	The probability (odds) of developer i expanding into a new genre in the time period \hat{t} (2007-2009)
$\text{TrendConsEval}_{i,t}$	The trend of consumer evaluations of games released by developer i in the time period t (2001-2006)
$\text{TrendExpertEval}_{i,t}$	The trend of expert evaluations of games released by developer i in the time period t
$\text{TrendSales}_{i,t}$	The trend of sales of games released by developer i in the time period t
$\text{VarConsEval}_{i,t}$	The variability of consumer evaluations of games released by developer i in the time period t
$\text{VarExpertEval}_{i,t}$	The variability of expert evaluations of games released by developer i in the time period t
$\text{VarSales}_{i,t}$	The variability of sales of games released by developer i in the time period t
$\text{Nr. Games}_{i,t}$	The number of games released by developer i in the time period t
$\text{Competition}_{i,t}$	The number of games in the same genre occupied by developer i in the time period t that are not developed by i
$\text{AvgConsEval}_{i,t}$	The average of consumer evaluations of games released by developer i in the time period t
$\text{AvgExpertEval}_{i,t}$	The average of expert evaluations of games released by developer i in the time period t
$\text{AvgSales}_{i,t}$	The average of sales of games released by developer i in the time period t

4.3.3. Variables

4.3.3.1. Dependent Variable

The dependent variable in this study is whether or not the organization expands into new video game genres (1 = at least one video game released in a new genre, 0 = there are no video games released in a new genre). The timeframe for the dependent variable ($t \hat{t}$) is the period from financial year 2007 to 2009. This timeframe is different from the timeframe (t) for the independent variables, which focus on the period from financial year 2001 to 2006.

The main reasoning behind the difference in the timeframe is that video game development is not an instant process. Video game development comprises of different development and testing stages to ensure the quality and stability of the resulting product (Egenfeld-Nielse, Smith and Tosca, 2012; Hall and Novak, 2008). The whole development process requires 24 months on average (Egenfeld-Nielse, Smith and Tosca, 2012; Hall and Novak, 2008). Therefore, if the management team decides to release a game in a new genre and this decision is taken at the end of financial year 2006, the earliest date for the launch date of the new game is at the end of financial year 2007. In order to accommodate for the differences of development time across games, this study extends the timeframe for the outcome variable to financial year 2009.

4.3.3.2. Independent Variable

The independent variables relate to trends and variability in video game performance in the past (2001-2006). To measure video game performance, the study uses three measures at the developer level. The first measurement is worldwide unit sales. Unit sales are a leading performance indicator for most companies as prices are relatively similar (Popova and Sharpanskykh, 2010; Venkatraman and Ramanujam, 1986).

Other performance measures are reviews by critics and end users. Reviews are forms of certification that can have a strong impact on consumer behavior, especially if the quality of the product is difficult to evaluate before consumption (e.g., Basuroy, Chatterjee, and Ravid, 2003; Gemser, Oostrum, and Leenders, 2007; Yang and Mai, 2010). Prior research suggests that expert and end user certification may substantially differ, both in nature and in degree of impact (Gemser et al., 2007; Moon, Bergey, and Iacobucci, 2010; Gemser, Leenders, and Wijnberg, 2008). Thus, contrary to prior research (e.g., Keller, 1993; Hennig-

Thurau, Houston, and Heitjans, 2009), this study makes an explicit distinction between expert and end user evaluations.

To calculate the trend or variability of performance, figures on yearly sales performance, consumer evaluations, and expert evaluations were calculated first. Yearly sales performance is the total sales of all games from a developer in a particular year. Yearly expert (consumer) evaluation is the average expert (consumer) evaluation score of all games from a developer in a particular year. Data on worldwide expert and consumer game evaluations comes from Metacritic.com; data on worldwide unit sales data on video games comes from the on-line database vgchartz.com.

Trend in performance. Yearly performance trends are calculable after obtaining the yearly performance data. Such calculation results into three trend lines: one for sales, one for consumer evaluations, and one for expert evaluations. This study uses the derived slope coefficients of the estimated trend lines as the measurement of trend of performance. These coefficients can be positive or negative; a positive value means the performance is increasing from 2001 to 2006, while a negative value means that the performance is decreasing. If the absolute value of this variable is larger, the trend's slope is steeper (Spicer, 2004: 23).

Variability in performance. This study uses variance as the method to calculate variability. This approach is not uncommon considering that prior literature also uses variance to measure variability and uncertainty (e.g., Dacin and Smith, 1994; Desai, Kalra, and Murthi, 2008). Similar to trend, this study uses the same yearly performance indicators to calculate the variability of performance from 2001 to 2006. After obtaining the yearly performance data, the variance of performance across years are calculated for each type of performance.

Competition. Competitive intensity in a genre is measured from a supply side perspective counting the total number of competing games in the same genres released by the developers in the period 2001 to 2006 minus their own games in that genre. Thus, for example, in the financial period 2001 to 2006, there were 665 games worldwide in the adventure genre, 290 games in the Role Playing genre, and 252 games in the First Person Shooter genre. Developer *i* produced 5 games in the role playing genre and 2 games in the first person shooter genre. The competition for developer *i* is $(290-5) + (252-2) = 535$.

This study controls for several factors. The first control variable is the total number of games from the same developer within the period of 2001 to 2006. This variable (Nr. Games) reflects the differences in resources of each video game developer to produce different products within the time frame 2001 to 2006. The assumption is that the more games a firm develops, the higher the probability this firm engages in explorative behavior. Finally, as an alternative to performance trend, the analyses include the average of consumer evaluations, the average of expert evaluation, and the average yearly sales in the period of 2001 to 2006.

4.4. Empirical results

4.4.1. Descriptive statistics and correlations

Table 4.2 presents the descriptive statistics and the correlations between the variables. In the period 2001-2006, 1812 video games were released in total. On average, each video game developer released 11 games and had a gradual but positive slope in terms of total sales in the specified time frame. Of the video game developers in the sample, 158 developers explore new genres within this period while the majority, 204 developers, remained active in the same genres in the 2001-2006 period.

Table 4.2 shows a negative correlation between the sales trend and exploration ($r = -.12$, $p < .05$). Table 4.2 also shows a positive relationship between exploration and the variability of consumer evaluations ($r = .20$, $p < .01$) and between exploration and the variability of sales ($r = .14$, $p < .01$). The relationship between exploration and trend of expert evaluation is positive but insignificant ($r = .02$, $p > .05$). There is no significant correlation between exploration and variability of expert evaluations either ($r = .09$, $p > .05$). Overall, the correlations between the independent variables do not exceed the $r = .50$ level. Multicollinearity is not a major concern here.

Table 4.2 Bivariate Correlations and Descriptive Statistics

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11
1 Exploration	.44	.50											
2 Trend Cons. Eval.	-.05	1.41	-.10										
3 Trend Expert Eval.	-.07	.61	.02	.37**									
4 Trend Sales	.95	2.09	-.12*	.32**	.01								
5 Var. Cons. Eval.	3.98	5.14	.20**	-.26**	.01	-.21**							
6 Var. Expert Eval.	1.06	1.98	.09	-.14**	-.02	-.07	.36**						
7 Var. Sales	45.73	80.26	.14**	.08	-.20**	.39**	-.12**	-.04					
8 Nr. Games	11	10.66	-.20**	.07	-.04	.21**	-.09*	.05	.31**				
9 Competition	459	318.01	.25**	.17**	.06	-.09*	-.02	.06	-.03	.45**			
10 Avg. Cons. Eval.	5.83	2.37	-.26**	.03	-.03	.25**	-.04	-.09*	.32**	.33**	.20**		
11 Avg. Expert Eval.	4.88	1.57	.13*	.07	-.07	.27**	.10*	-.10*	.38**	.27**	.17**	.46**	
12 Avg. Sales	.80	.74	-.27**	.10*	-.22**	.31**	-.12**	-.11*	.37**	.43**	.05	.46**	.41**

** . Correlation is significant at the 0.01 level (2-tailed).
 * . Correlation is significant at the 0.05 level (2-tailed).

4.4.2. The determinants of explorative behavior

Two logit models are estimated to explain the occurrence of explorative behavior at the organizational level: Model 1 is the default model that only contains the control variables; Model 2 is the complete model that includes all of the main constructs. Model 2 will be used to test the hypotheses. Model 1 explains 82.3% of the variance in explorative behavior (Nagelkerke $R^2 = .56$); Model 2 explains 92.5% of the variance in behavior (Nagelkerke $R^2 = .80$). The significant decrease of $-2 \times \log$ -likelihood between Model 1 and Model 2 signifies an improvement of predictability in the complete model (164.39) from the default model (300.50). Table 4.3 shows the results.

The results show that a positive performance sales trend and a positive consumer evaluations trend have a negative effect on the probability of explorative behavior ($B = -.335$, $p < .05$ for consumer evaluations; $B = -3.44$, $p < .05$ for sales). A positive trend of expert evaluations has, however, no significant effect on the probability of explorative behavior ($B = .39$, $p = .09$). These results suggest that organizations are less likely to explore when consumers support their products, both in term of sales and evaluations. Support from experts seems to influence firms' tendency to explore in a positive way rather than a negative way, as predicted. However, this relationship is only marginally significant ($p < .10$) and thus these findings should be interpreted with care. In sum, the results of the analysis partly support Hypothesis 1.

Table 4.3. Results Exploration Models

Variable	Coefficient	Model 1			VIF	Coefficient	Model 2		
		S.D.	t				S.D.	t	VIF
constant	1.13	.54	2.08	*	-2.51	.82	-3.07	**	
Competition	.01	.00	7.02	***	.02	.00	6.33	***	
Nr. Games	-.21	.03	7.70	***	-.35	.06	-6.42	***	
Avg. Cons. Eval.	-.21	.05	-4.06	***	-.40	.18	-2.25	*	
Avg. Expert Eval.	.71	.42	1.60		.90	1.13	.81		
Avg. Sales	-.34	.05	-6.40	***	-.12	.03	-3.84	***	
Trend Cons. Eval.					-3.35	1.56	-2.15	*	
Trend Expert Eval.					.39	.20	1.69		
Trend Sales					-3.44	1.51	-2.28	*	
Var. Cons. Eval.					.29	.09	2.90	**	
Var. Expert Eval.					.20	.13	1.51		
Var. Sales					.00	.00	2.09	*	
Trend Cons. Eval.* Competition					.01	.00	2.91	**	
Trend Expert Eval.* Competition					.00	.02	.07		
Trend Sales * Competition					.01	.00	3.62	***	
Var. Cons. Eval.* Competition					.01	.00	4.52	***	
Var. Expert Eval.* Competition					.55	3.83	.14		
Var. Sales* Competition					.00	.00	3.25	**	
Nagelkerke R ²		.56			.80				
c ² square		195.48	***		331.58	***			
-2*log-likelihood		300.5			164.39				

***. is significant at the 0.001 level (2-tailed). **. is significant at the 0.01 level (2-tailed). *. is significant at the 0.05 level (2-tailed).
 Note1: Binary Logit Model, the dependent variable is: Market Segment Exploration (Yes/No: Binary), 2007-2009
 Note2: The reported coefficients are not standardized due to the binary nature of the dependent variable (c.f. Chang, Kao, Kuo, & Chiu, 2012; Larimo, 2003)

Variability in evaluations signals a lack of stability of expert and consumer support for the products released by organizations over time. Hypothesis 2 suggests that in the case of high performance variability, firms will engage in explorative behavior to diversify operations and reduce risks.

This study indeed finds positive effects of variability of consumer evaluations ($B = .29, p < .01$) and variability of sales ($B = .00, p < .05$) on the probability of explorative behavior. However, variability of expert evaluations again has no significant effect on explorative behavior ($B = .20, p = .13$). These results partly support Hypothesis 2.

Competitive intensity has a positive relationship with the probability of explorative behavior ($B = .02, p < .01$). This result is similar to other studies who find that environmental dynamism is an antecedent of explorative behavior (Jansen, van den Bosch, Volberda, 2005). Furthermore, competitive intensity moderates the effects of trend of consumer evaluations ($B = .01, p < .01$), trend of sales ($B = .01, p < .001$), variability of consumer evaluations ($B = .01, p < .001$), and variability of sales ($B = .00, p < .01$). However, the study does not find significant coefficients for the moderating effects of competition towards the effect of expert evaluation trend nor variability. The results thus partly confirm Hypotheses 3a and 3b.

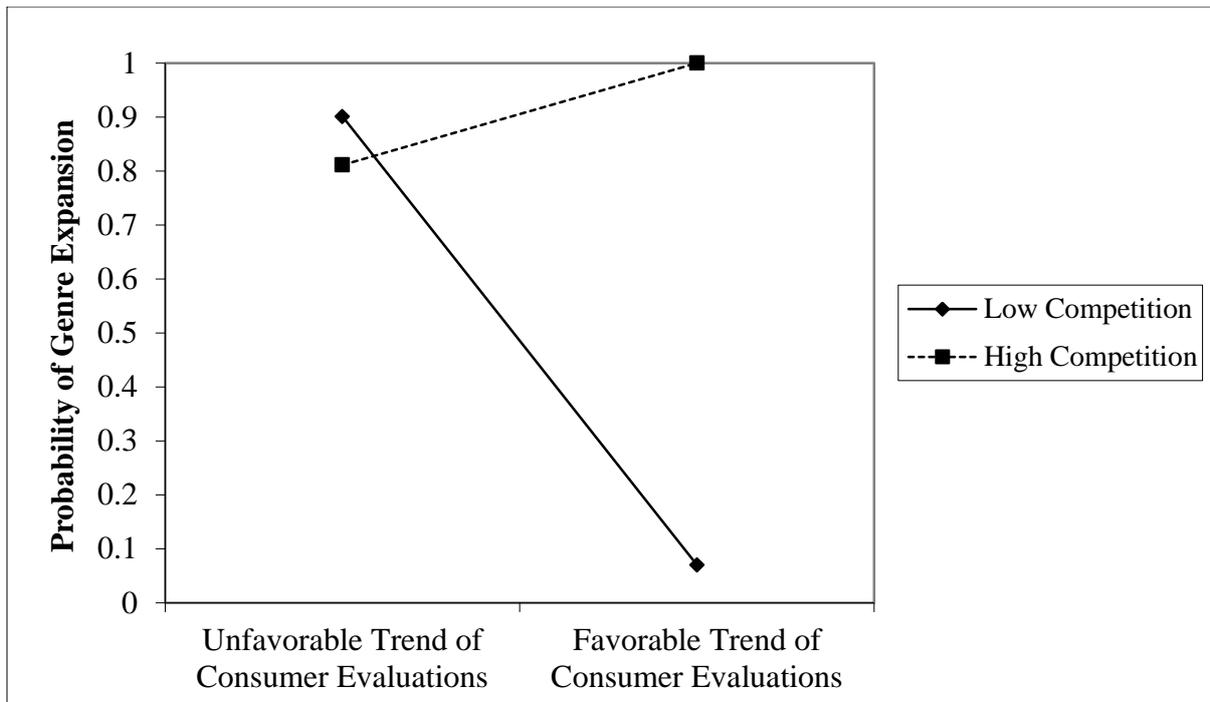


Figure 4.2 The probability of genre expansion affected by trend of consumer evaluations and competition

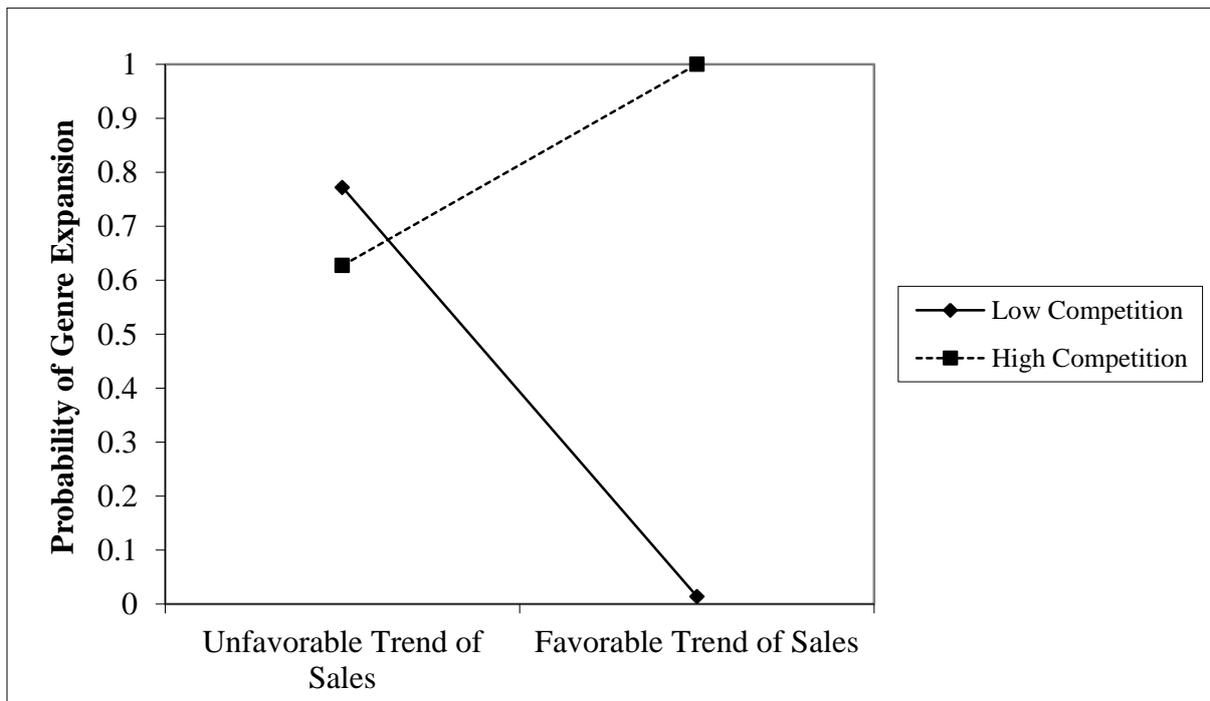


Figure 4.3 The probability of genre expansion affected by trend of sales and competition

Figure 4.2 visualizes how the underlying trend in consumer evaluations has a negative effect on explorative behavior. When competition is intense, the line is higher than when competition is low, indicating a positive moderating effect of competition on the trend of consumer evaluations. This effect is more prominent for the trend of sales (see Figure 4.3). Figure 4.4 and Figure 4.5 visualize the effects of variability in consumer evaluations and sales respectively on firms' probability to explore. The figures show a positive moderating effect of competitive intensity. Figure 4.5 suggest that whenever sales are highly variable over time, organizations will be more likely to engage in explorative behavior.

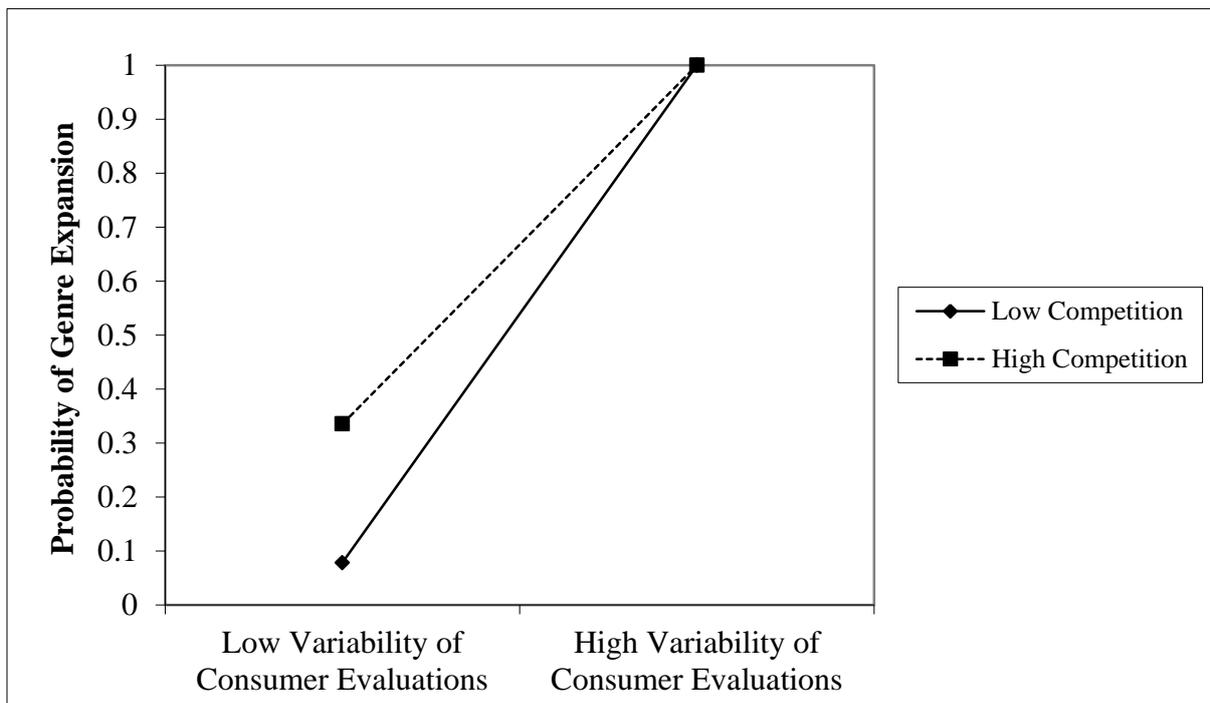


Figure 4.4 The probability of genre expansion affected by variability of consumer evaluations and competition

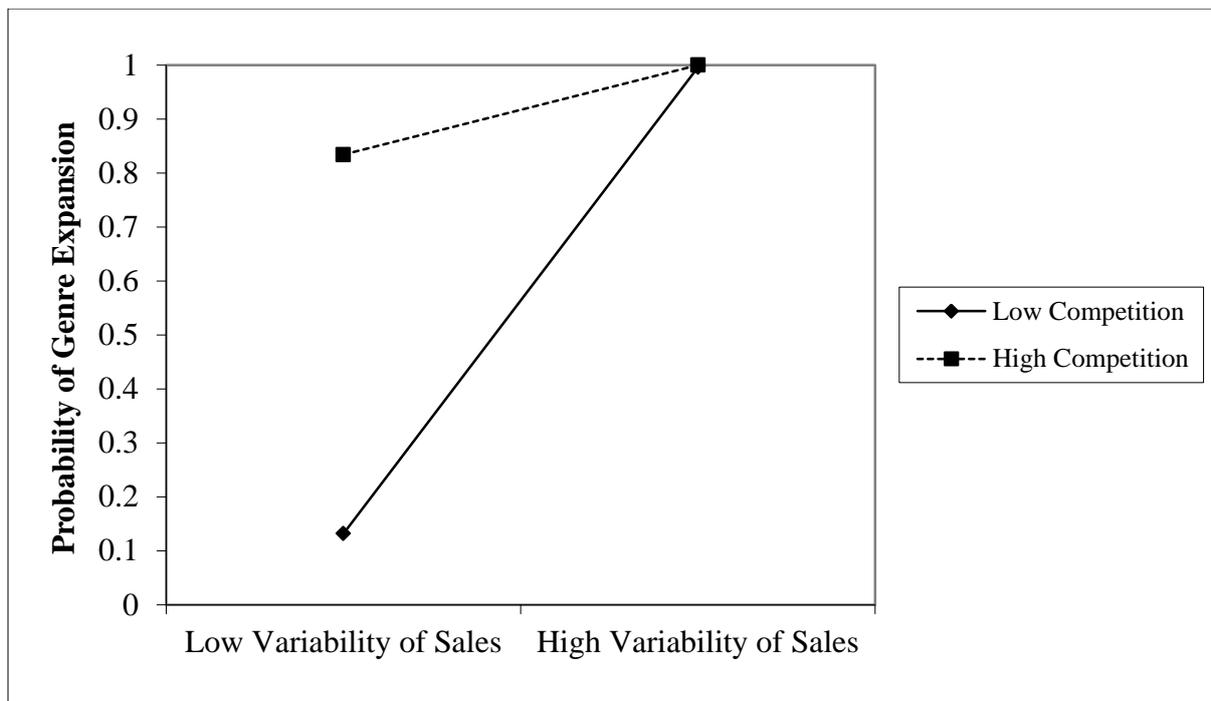


Figure 4.5 The probability of genre expansion affected by the variability of sales and competition

The variables that measure average performance (of sales, consumer evaluations, and expert evaluations) have the same sign and significance level as the trend indicators. The number of games produced by organizations has a significant effect on their tendency to explore ($B = -.35, p < .001$). Although significant, the sign is unexpectedly negative, which indicates that companies who produce more games are more likely to exploit the segments that they already occupy rather than entering new ones.

Table 4.4 Results Exploitation Model

Variable	Model 3			Model 4		
	β	t	VIF	β	t	VIF
constant	.46	2.08 *		.58	1.98 *	
Competition	.93	49.53 ***	1.01	.94	49.33 ***	3.37
Nr. Games	.04	1.74	1.36	.04	1.95	1.62
Avg. Cons. Eval.	.09	2.63 **	2.23	.10	2.97 **	2.52
Avg. Expert Eval.	-.01	-.34	2.45	-.02	-.51	2.69
Avg. Sales	.20	9.42 ***	1.16	.29	7.64 ***	1.38
Trend Cons. Eval.				.03	1.37	2.38
Trend Expert Eval.				.02	1.24	2.12
Trend Sales				.12	3.79 ***	2.70
Var. Cons. Eval.				-.05	-2.54 *	1.94
Var. Expert Eval.				-.03	-1.61	2.03
Var. Sales				-.17	-4.43 ***	1.93
Trend Cons. Eval.* Competition				-.04	-2.04 *	1.94
Trend Expert Eval.* Competition				-.05	-2.64 **	2.59
Trend Sales * Competition				-.07	-2.42 *	2.60
Var. Cons. Eval.* Competition				-.01	-.25	1.67
Var. Expert Eval.* Competition				-.01	-.63	1.66
Var. Sales* Competition				-.09	-3.47 ***	1.45
R ²	.86			.88		
Adj. R ²	195.48 ***			.87 ***		
F	300.5			121.03		

***. is significant at the 0.001 level (2-tailed). **. is significant at the 0.01 level (2-tailed). *. is significant at the 0.05 level (2-tailed).
 Note1: OLS Model, the dependent variable is: The quantity of sequel titles in the same genre from the same developer; 2007-2009
 Note2: The coefficients are standardized (beta)

4.4.3. Robustness test: The determinants of exploitative behavior

To examine whether the results are valid, the model is re-estimated using an exploitation measure instead of exploration measure as dependent variable. Exploitation is measured as the quantity of sequels or spin off titles in the same genre produced by the same developer in the period of 2007 to 2009. The Exploitation Model uses the same independent and control variables as the Exploration model (Model 2) (c.f. Voss et al., 2008). Since the model measures quantity of sequels and spin offs, the nature of the dependent variable is not binary. This situation allows for the use of the OLS estimation rather than logistic regression. Table 4.4 presents the results. The exploitation model explains 88% of the variability of its dependent variable ($R^2 = .88$). The results indicate some opposite effects compared to the exploration model. For example, the effect of trend of sales on exploitative behavior is positive and significant ($p < .001$), while it is negative and significant in the Exploration Model. The contradicting signs of the coefficients in exploration and exploitation models confirm prior studies which also find similarly contradicting effects of exploration and exploitation antecedents (Voss et al., 2008).

4.5. Discussion

The results of this study provide insight into the effects of organizational performance on explorative behavior. The study builds on literature on organizational ambidexterity that predominantly studies organizational performance as an outcome of explorative and exploitative behavior rather than an antecedent. The study also builds on organization theory literature on firms' risk taking behavior which suggests that companies will only engage in risk taking behavior if this behavior is really necessary, for example because of unsatisfying or unpredictable performance results.

The results of the study suggest that organizations will not risk disturbing the status quo by making changes when the market signals satisfaction with the quality of products delivered. A positive sales trend and consistent positive customer evaluations result in a reduced propensity to engage in explorative behavior. These findings do not confirm the results of Lubatkin et al. (2011) who examine how companies' performance of the previous year influences the ambidextrous orientation of SMEs and find no significant relationship. Lubatkin et al. (2011), however, use a rather restricted time period of one year. This paper uses a longer time frame, and looks at trends, to better and more fully assess influences of past performance. Furthermore, Lubatkin et al. (2011) measure explorative and exploitative behavior as a joint construct, while this study examines exploration and exploitation separately.

Interestingly, a positive trend of expert evaluations seems to stimulate rather than to hinder explorative behavior by organizations. Perhaps positive evaluations from experts provide organizations sufficient confidence to enter into new areas. Organizations operating in the creative industries often use critical acclaim as evidence of organizations' success in creating a high quality product. In the video game industry, for example, it is not uncommon to boast critical acclaims in the promotion materials of a new game, similar to the movie or music industry. However, since the relationship between a positive trend in expert evaluations and explorative behavior is only marginally significant ($p < .10$), the results should be interpreted with care.

Overall, the findings suggest that the source of the performance indicator (either the end user or the expert) plays a role in how decision makers use these indicators in making decisions to explore or exploit. Other recent findings show that quality signals such as reviews or awards originating from different types of evaluators can have very different effect on the behavior of consumers (Gemser et al. 2008) or investors (Ebbers and Wijnberg,

2012). This study adds to this stream of research by showing that quality signals originating from different types of evaluators can have very different effects on the behavior of producers.

The study finds that variability of performance has a positive effect on explorative behavior, when performance is measured in terms of sales trend and consumer evaluation trend. These results and the results on performance trends suggest that using types of measurements that reflect changes, such as trends, growth, and variability rather than static representations of the constructs can help to explain phenomena. Indeed, the models in this study explain much of the variability of the dependent variable.

Competitive intensity is an important moderating variable that influences the relationship between past performance and exploratory behavior. Competitive intensity weakens the effect of performance trend and increases the effect of performance variability on firms' tendency to explore –when performance is operationalized in terms of market acceptance. These findings provide support for competition as an important environmental moderator.

The model is valuable for managers to be able to better predict explorative behavior of their competitors by simply using sales, consumer evaluations, and expert evaluations records of those organizations. Managers who are able to predict their competitors' actions and who are able to develop strategy that anticipate these actions should find themselves in a better position in administering their organization. Besides business managers, market analysts or investors can also use the results to develop a forecast of future strategic decisions of the firms that they investigate.

4.5.1. Limitations and future research

The sales data used in this study are from Vgchartz.com. This website records sales data of video games if these game have, at minimum, sold 10.000 copies worldwide. Thus the data

may be skewed towards larger video game developers. Research that also covers small developers can be difficult and expensive to conduct. However, future research may benefit from technologies like web-crawling to obtain such data.

The focus of the study is on antecedents of explorative behavior, rather than striving for a balanced portfolio of exploitative and explorative behavior. The study examines antecedents of exploitative behavior and finds that, similar to prior research, the results are opposite to the results of the antecedents of explorative behavior. Future research is however, needed to examine how trends and variability in past performance affect organizational ambidexterity.

The use of objective performance data rather than self-reported data from large scale surveys is a strength of this study. Future studies may, however, want to provide a more complete model that uses both performance data and organization attributes data to predict explorative behavior. In the current study only one organizational attribute was included, namely the number of games produced as a proxy for firm size.

The research uses data from the video games industry. The results should be generalizable to other creative industries where exploration by developing new genres is common, such as book publishing, the movie, theatre, and music industries.

Appendix 4.A The list of genres used in this research

Genre	# Titles Financial Year 2001-2009
Action	540
Adventure Games	665
Alternative Sports	104
Baseball	63
Basketball	79
Car Combat	23
Card Battle Games	16
Combat Sims	39
Compilations	112
Exercise / Fitness	20
Fighting Games	167
First-Person Shooters	252
Football	73
Futuristic Combat Sims	36
Golf	49
Hockey	35
Miscellaneous	202
Other Driving Games	66
Other Shooters	404
Other Sports Games	245
Other Strategy Games	75
Parlor Games	180
Party Games	83
Platformers	339
Puzzle	263
Racing	399
Real-Time Strategy	50
Rhythm Games	179
Role-Playing	290
Simulations	24
Soccer	49
Tactical Shooters	46
Turn-Based Strategy	62
Virtual Life Games	48
Wrestling	35
Total	5312

“The plague of mankind is the fear and rejection of diversity: monotheism, monarchy, monogamy... The belief that there is only one right way to live, only one right way to regulate ... is the root cause of the greatest threat to man. ”

— Thomas Stephen Szasz

5. The Marketing/R&D Interface and New Product Performance: the Effects of Relative Influence Changes and Integration⁶

Abstract

In this paper, we start with the premise that the relative influence of marketing and R&D in New Product Development (NPD) is an important part of the marketing – R&D interface that affects new product success. We show that changes in relative influence can lead to different performance outcomes and that these outcomes dependent on the history of prior influence changes in the company and the level of integration between marketing and R&D. Based on an international survey among 106 pharmaceuticals companies, we find that there is a significant positive relationship between radical influence changes and subsequent new product performance. Moreover, we find that a history of influence changes serves organizations to build up capabilities that, in turn, strengthen the positive effects of radical influence changes. Finally, we find that organizations that focus on integration without taking into account the radicalness and the history of relative influence changes can run into the ‘integration trap’.

Keywords: New Product Success, Marketing-R&D Interface, Relative Influence Changes, Integration Trap

5.1. Introduction

New Product Development (NPD) is a complex process that involves different functional areas, particularly R&D and marketing, which have to be aligned in order to achieve organizational goals (Gupta, Raj & Wilemon, 1986, Leenders). Marketing is generally more oriented towards commercial goals, while R&D is more oriented towards technical achievements (Griffin & Hauser, 1996; Gupta, Raj & Wilemon, 1986; Rosenbloom, 1985). Competence specialization and diversity allows the organization to better use information

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from different environmental sub systems, but at the same time creates organizational integration challenges (Lu & Yang, 2004; Saghafi, Gupta & Sheth, 1990; Troilo, De Luca & Guenzi, 2009).

In the literature of the marketing - R&D interface, a lot of attention has been paid to the concept of 'integration' between different functional areas (Griffin & Hauser, 1996; Leenders & Wierenga, 2008). Integration has been operationalized as a measure of quality of communication, for example, and of involvement and information flows in the NPD process (Griffin & Hauser, 1996; Henard & Szymanski, 2001; Troy, Hirunyawipada & Paswan, 2008). According to this stream of literature, integration plays an important role in producing more successful new products (Griffin & Hauser, 1996; Hoopes & Postrel, 1999; Ittner & Larcker, 1997). However, several studies suggest that integration has a weak, or at best conditional, relationship with new product performance (Henard & Szymanski, 2001; Troy, Hirunyawipada & Paswan, 2008) and that there may be costs involved (Cuijpers, Guenter, and Hussinger 2011).

The starting point of the argument of this article is that good communication and coordination, the essence of integration, is only one aspect of the marketing – R&D interface. In any joint decision process, each entity possesses some degree of relative influence, which refers to the power to enforce one's preferences over the other (Corfman & Lehmann, 1987). At a given time, the influence of marketing and R&D can be balanced or one side can be more dominant (Atuahene-Gima & Evangelista, 2000). As organizations evolve, the distribution of relative influence may change in different directions resulting in different change patterns across companies.

Changes in relative influence can be triggered by a great variety of causes, such as changes in the market environment or in the firm's NPD strategy. In addition, leadership changes – for instance, the appointment of a new CEO – can also lead to relative influence

changes since CEO background can affect firm orientation (Merlo 2011). In Philips Electronics, for example, there were important changes in relative influence when a marketing manager from the food company Sara Lee became CEO. In a more general sense, changes in relative influence indicate the search for the most productive relationship configuration that fits the organization's needs.

In this paper, we analyze the effect of relative influence changes on new product performance. Instead of focusing on the static relative influence balance, we focus on the dynamics of relative influence over time. While companies continuously balance the technological and market inputs to new product development, one can observe more or less radical changes and also characterize the history of the changes in relative influence. The question here is what type of influence change pattern is more productive in a broader marketing – R&D interface perspective? The broader goal of our study is to shed more light on marketing – R&D processes and study under what conditions symbiotic relationships emerge. Symbiotic relationships rely not only on cooperation, communication and involvement, but also on processes such as shifts and rotation in relative influence (Davis & Eisenhardt, 2011).

Next, we present the theoretical background from which a number of hypotheses are derived. Then, we explain the data collection method, measurement scales, and data. In the analysis, we provide a test of the hypotheses. Finally, we discuss our findings and provide managerial implications.

5.2. Theoretical background and hypotheses formulation

Specialization and integration are two fundamental dimensions to designing any organization. Specialization is needed to deal with complex sub systems in the environment (e.g., customers, competitors, policy makers, and technological communities) and the different units need to be aligned through integration because goals and orientations of different units tend to diverge (Griffin & Hauser, 1996; Gupta, Raj & Wilemon, 1986; Hirunyawipada, Beyerlein & Blankson, 2010; Rosenbloom, 1985; Shaw & Shaw, 1998; Shaw, Shaw & Enke, 2003).

The level of relative influence of the R&D department (relative to marketing or vice versa) has become an increasingly important subject in the literature. Verhoef and Leeflang (2009) suggest that a more influential marketing department is generally beneficial because a marketing department's influence is related to a stronger marketing orientation (see also Homburg, Workman & Krohmer, 1999). Advocates of an influential R&D department, however, would argue that more R&D influence would benefit the technological sophistication of the new products. As members of a technological community, R&D professionals will have preferences towards technological achievements or scientific recognition (Dietz & Bozeman, 2005). This may create a sustainable competitive advantage for the company as well (Dewar & Dutton, 1986). As a result, we do not focus on the relative influence of one department per se, but on the effects of *changes* in relative influence and the capabilities that are needed to make these changes more beneficial to the company.

NPD involves a range of interdependent tasks for which the organization builds routines to bridge different functional areas. A change in the relative influence structure of the organization may disrupt these routines and make the organization more vulnerable to failure (Stinchcombe, 1965). In particular, more radical changes in the distribution of

influence between marketing and R&D may be harder to accept for the other side and lead to more conflicts and little agreement on what is good for the organization as a whole. These interface frictions may potentially lead to a waste of resources, the creation of insecurities for the employees, and a stifling of creativity (Brettel, Heinemann, Engelen & Neubauer, 2011).

However, one can also argue that more radical changes in relative influences between marketing and R&D in the NPD process can be beneficial. Davis and Eisenhardt (2011) present a discussion of leadership rotation between two actors that have different expertise and orientations (e.g. a hardware manufacturer and a software developer). If the circumstances in which the collaborative venture operate change, a shift of influence to the side that can best deal with the situation can be beneficial. They also argue that there may be unidirectional shifts that do not have this beneficial effect.

Building in Davis and Eisenhardt (2011), we introduce the concept of a more radical influence change and define it as the degree to which the organization experiences a change in relative influence relative to the base change pattern in a certain period. Since earlier research has also shown that radical innovations play an important role in new product performance in general, more radical changes in relative influence may be beneficial (Tellis, et al. 2009). As a counter argument, it can be proposed that organizations in rapidly changing environments such as high-tech fields that do not experience radical changes in influence will on average perform less well because they cannot respond to dramatic changes in technologies, customer demands and regulations (Leenders & Voermans, 2007). The reconfigurations of relative influence allow a transformation of the way people interact in the NPD process. The department that loses relative influence will – per definition – be forced to adopt to a greater extent the perspective of the other department, which can broaden their view, and help them to escape equilibrium traps and tunnel vision (Amabile, 1998; Davis & Eisenhardt, 2011). Firms that increase the relative influence of the marketing department

substantially may gain new insights about the market and competitors, or the other way around, firms that shift from marketing influence towards R&D influence would be able to gain new insights about emerging technologies which may benefit the early adoption of new technologies (Tellis et al. 2009), as well as the development of new products and the establishment of, or entry into, new markets (Christensen & Overdorf, 2000).

Change in general is often linked to creativity because it resets the organizational clock (Amburgey, Kelly & Barnett 1993) and decreases the strength of inertia that is detrimental to individual creativity (Ford & Gioia, 2000) and firm innovativeness (Meus & Oerlemans, 2000; Pierce & Delbecq, 1977). A radical change would force the organization to reset its current perspective and learn about new possibilities, knowledge, or ideas, all of which can improve performance, especially in respect to new product development. More radical changes of relative influence may redirect marketing and R&D personnel towards more productive areas and more diverse ideas (Burkhardt & Brass, 1990) and improve creativity (Amabile, 1998). Thus the hypothesis is as follows:

H1. *More radical changes with respect to relative influence of marketing and R&D have a positive relationship with new product performance.*

Of course, the level of change cannot be increased so far that the organization becomes itself unstable or threatens to fall apart. It is likely that too much change – also in the area of relative influence - can mitigate the beneficial aspects of any change event. At very high levels of change the relationship may even top-off or become inverted U-shaped and we will explore these relationships in our analysis and results section.

Having change as a regular activity is beneficial for organizations (Klarner & Raisch, 2013). Previous study has shown that extended period of stability leads to organizations inertia (Hannan & Freeman, 1984). Regular changes help managers to overcome inertia before they are trapped in spirals of complacency.

As firms change over time, they may develop a 'routine to learn new routines' (Eisenhardt & Martin, 2000; Eng & Quaiia, 2009; Teece, Pisano & Shuen, 1997). In other words, organizations learn to change by changing and the more an organization changes its relative influence balance, the more likely it is to develop modification routines and competencies in that area that build a capacity for adaptive change (Amburgey et. al., 1993). Such changes do not necessarily need to be radical, but organizations may differ in the degree to which they experience continuous - and to some extent regular and automatic - rates of change (Klarner & Raisch, 2013). These changes can produce adaptive capabilities that affect the relationship between a more radical change and new product performance positively. Without regular changes across time, organizations would not be able to relate to the experience gathered from executing past changes (Levitt & March, 1988), and during such a long period of stability, inertia may become too strong, ultimately reducing organization's ability to undertake subsequent changes (Hannan & Freeman, 1984).

So, we not only argue that stability in relative influence is less productive than relationships that experience substantial changes in influence above the base rate of change, but also that longer term change patterns may create adaptive capabilities that make radical changes more productive in terms of new product performance. Thus the hypothesis is as follows:

H2. *The positive effect of more radical changes with respect to relative influence of marketing and R&D on new product performance is more positive for organizations with a richer history of relative influence changes*

A key characteristic for many decisions in NPD is that they involve tradeoffs that require some judgement (Hauser, 2000). Exercising an informed judgement implies the need for in-depth information from different sides. So, apart from relative influence, concepts such as 'integration between marketing and R&D' related to cross functional communication and involvement play an important role in the broader marketing-R&D interface. In the area of channel management and retailing, for example, relative influence is studied in connection with communication patterns between producers and retailers as well. Communication is needed to coordinate the actions of channel members and relative influence is needed to resolve potential conflicts that arise from different preferences and to maintain commitment (Boyle, Dwyer, Robicheaux & Simpson, 1992).

Lawrence & Lorsch (1969) defined integration as organizations' efforts to achieve unity between various organization subsystems. Gupta et al. (1986) further refined this concept by suggesting that integration exists if there is a continuous exchange of information between two parties creating trust and harmony (Troy, Hirunyawipada & Paswan, 2008). In addition to this, achieving integration is argued to reduce the possibility of opportunistic behavior, as well as to promote trusting relationships, and the compatibility of individuals (Tsai & Ghoshal, 1998). Consequently, integration is often considered as an important factor in improving time to market, creativity and new product performance in general (Amabile, 1998).

Interestingly, there are several studies that question the effectiveness of integration in specific situations. For example, Leenders and Wierenga (2008) showed that if organizations have small resource stocks with respect to the development and commercialization of new products, integration between marketing and R&D in itself may not have the expected positive effects on new product performance. In addition, integration seems to have less positive effects for companies that operate in a broad range of product markets. In the context of radical innovation, some authors have argued that integration may exert at least some potentially detrimental effects; for example marketing and R&D may focus too much on the status quo (Brettel, Heinemann, Engelen & Neubauer, 2011). In the same vein, 'too good friends' (e.g., Souder 1980, 1988) can constitute a danger to careful decision making regarding tradeoffs. When group members get along well and experience strong interpersonal interactions with each other, they may resist stating their concerns about issues found during NPD. In these cases, team members may fail to challenge each other's theories and conclusions (Brockman, Rawlston, Jones & Halstead, 2010).

Extending the previous discussion on the pros and cons of integration into our discussion of relative influence changes in the NPD process, one can argue that the capability to maintain high levels of integration between marketing and R&D while experiencing a rich history of influence changes may help to improve new product performance outcomes even further. As the relative influence of marketing and R&D rotates over time, the organization develops capacities to handle more radical changes more effectively (H2). Particularly in the event of changes in technological or market priorities, a lot of rivalry may occur between marketing and R&D. This may even lead to R&D becoming ignorant regarding marketing information and marketing being ignorant about long term R&D contributions to competitiveness (Maltz, Souder & Kumar, 2001). Therefore, high levels of integration, together with low levels of historical changes in relative influence may indicate a state of 'too

good friends' more than true integration. Such organizations are not equipped to handle more radical influence changes and organizational members would rather maintain a state of stability than focus on making the change productive for the organization (Brettel, Heinemann, Engelen & Neubauer, 2011). One illustration may be that in the case of R&D generating a potential technological breakthrough while marketing is not able to evaluate its commercial viability as customer reactions can hardly be foreseen due to a lack of market intelligence and experience. In this situation, a radical change of relative influence may have extraordinary benefits, but since the organization has not build sufficient adaptive capabilities to handle such changes, the outcome will likely be suboptimal. Thus the hypothesis is as follows:

H3. *The effect of more radical changes in relative influence of marketing and R&D is less positive for companies with a stable history of relative influence changes together with a high level of integration (and more positive for companies with a rich history of relative influence changes together with a high level of integration).*

5.3. Research method

5.3.1. Research context and data collection

The pharmaceutical industry was selected as a research setting for this study This industry is often taken as a subject in empirical studies because of the transparency and well-documented conditions that lend themselves very well to analyzing NPD and innovation processes (e.g. Nerkar & Roberts, 2004; Rafiq & Saxon, 2000; Sorescu, Chandy & Prabhu, 2003). Data were collected through an international mail survey among senior managers involved in Marketing and/or R&D at the corporate level. If the company was multidivisional, we chose the manager from the pharmaceutical division. These senior

executives were expected to possess the best knowledge regarding the issues being researched (Campbell, 1951; Seidler, 1974). In addition to the questionnaire data, we collected factual data through desk research on the company's new product performance in terms of the actual sales generated by new products (less than 5 years on the market).

A total of 700 questionnaires were sent out to pharmaceutical companies using ESOMAR's database on pharmaceutical companies worldwide. We focused on companies with annual revenues above \$50 million, thereby deleting small and specialized biotech companies from the sample. All the companies possess considerable marketing and R&D operations and this was further verified in the questionnaire. After a reminder and an additional wave, 136 usable questionnaires from knowledgeable managers were returned (19.4%), which is acceptable considering the average single digit response rate of international mail survey in other studies (Dillman, 1999; Jobber, Allen & Oakland, 1985; Menon, Bharadwaj & Howell, 1996). The level of NPD knowledge of the responding executive was assessed by means of a question that asked whether the respondent was able to assess corporate new product development decisions and success over the last 12 years. This reduced the effective response set to 106, or 78 percent of the initial sample.

We tested for possible non-response bias by comparing late (the last one-third) and early responses (the first one third) in terms of missing values and means and variances of the major measures and this revealed no significance differences at the $\alpha = .05$ level indicating that non-response bias is not an issue of concern here (Theodosiou, Kehagias & Katsikea, 2012).

The final sample consists of responses from Europe based companies (51%), US based companies (36%), and Japan based companies (13%). The companies in the sample have average annual revenues of \$3.2 billion and an average of 10,400 employees of which

1,580 are R&D employees and 1,100 are marketing employees. The average budget allocated to marketing and R&D is \$1.04 billion on average. Interestingly, the mean marketing budget is quite similar to the mean R&D budget (both close to \$500 million).

5.3.2. Measurement

We measured constructs using multi-item scales obtained from the literature as much as possible. In line with Loch, Stein and Terwiesh (1996), we define new product performance in terms of output and market performance. A list of four items was collected from the literature (e.g., Griffin & Page, 1993). For a description of the items see Appendix A. In the questionnaire, respondents were asked to assess the performance (based on a scale of 1 to 5) of their company, compared to companies of similar size over the period of the past five years. This method tends to produce scores that are consistent with factual measures while directly controlling for size (Dess & Robinson, 1984). A score of "5" on the question "The performance of the products that have been launched in the last five years" means the company is in the top performing 20% of similar companies.

In line with Homburg, Workman and Krohmer (1999), *Relative Influence* is defined as the extent to which a functional area has an impact on NPD and it was measured using a constant sum scale. Following Homburg, Workman and Krohmer (1999), respondents were asked to score the balance of influence between marketing and R&D. The score of R&D's influence (relative to marketing) lies between 0 and 100 (the sum of both scores equals to 100) and the higher the score on the relative influence scale, the higher the relative influence of R&D is in NPD.

We asked the respondents to provide their scores on relative influence at different points in time (12 years ago, 8 years ago, 4 years ago, and present). Other studies in the pharmaceutical industry, have taken similar time spans (e.g., Cardinal, 2001). From other

research it is also clear that memory does not degrade gradually when assessing the past, but that there can be periods of vivid memory related to important events (Rathbone, Mouline & Conway, 2008). Since relative influence changes are important to the NPD process as a whole and the managers involved in particular, our setting is quite suitable to obtain reliable and valid responses. In addition, if the respondent could not judge all periods, we deleted the company from the sample because of a lack of knowledge of the respondent.

A *radical change (RC)* is defined as the magnitude of a change in a specific period divided by the company's average baseline change (*CAC*). We focus on the radicalness of the change between t-0 and the t-1 (covering 4 years). Radical changes that refer to eight or twelve years ago are considered less relevant for now but these changes can be explored as well as we can use the same formula for other periods and timeframes. A more radical relative influence change for company *j* (RC_j) is measured as follows:

$$RC_j = \frac{|RI_{j,t=0} - RI_{j,t=-1}|}{CAC_j} \quad (1)$$

$RI_{j,t=0}$ = the level of relative influence of company *j* in the most recent period (t0)

$RI_{j,t=-1}$ = the level of relative influence of company *j* in the earlier period (t-1)

$$CAC_j = \frac{|RI_{j,t=-3} - RI_{j,t=-2}| + |RI_{j,t=-2} - RI_{j,t=-1}| + |RI_{j,t=-1} - RI_{j,t=0}|}{3}$$

Later in this study, we will explore different operationalizations using a pre-determined cut-off point to classify as a radical influence change to validate the robustness of our findings.

The history of changes (HC) is measured by the cumulative changes in relative influence across all periods that we measured for a specific company (*j*). The absolute change

between the initial and final period is used as the denominator of HC because then our measure behaves in such a way that if organizations experience a one-directional shift in relative influence they score lower than organizations that have more rotations (see Davis & Eisenhardt, 2011). We specify the degree to which an organization has a rich history of changes (HC_j) using the following formula:

$$HC_j = \frac{\sum_{i=0}^2 |RI_{j,t=i} - RI_{j,t=i-1}|}{|RI_{j,t=0} - RI_{j,t=-3}|} \quad (2)$$

Integration of marketing and R&D is defined as communication, joint goals and good relationships between marketing and R&D and is measured using an existing 15 item scale (Pinto, Pinto & Prescott, 1993). *Resources* were defined as NPD knowledge, relationships and assets and we collected items from earlier studies (Dierickx & Cool, 1989; Dutta, Narasimhan & Rajiv, 1999; Teece, Pisano & Shuen, 1997; Leenders & Wierenga, 2008). The scale of NPD resources can be interpreted as a formative (formed) scale, in which the elements cover different aspects of the overall resource pool that are summed up to obtain the current state of an organization's NPD resources (see also Rossiter, 2002). *Strategic focus* was defined as the product and market scope of the company and measured using an existing scale (Cool & Schendel, 1987; Leenders & Wierenga, 2008). The *centralization* and *formalization* measures were taken from Hage and Aiken (1967), and Zaltman, Duncan and Holtbek (1973). Finally, in line with other studies, we control for *geographic location* of the company's headquarters (Garrett, Buisson & Yap, 2006).

5.4. Empirical results

5.4.1. Reliability and validity

Confirmatory factor analysis (CFA) was used to assess the overall measurement model. The CFA containing all the measures and all the items resulted in an adequate fit (RMSEA = .072). However, there may be some concerns regarding the number of data points per parameter. Therefore, we constructed a partially disaggregated model that comprises of aggregated composites for the measures (Bagozzi & Edwards, 1998). Analysis on the disaggregated model resulted in a good fit as well (RMSEA = .08, CFI = .92, TLI = .91).

Internal consistency was verified by calculating Cronbach's α coefficients and AVE's. The results are the followings: integration of R&D and marketing (15 items, $\alpha = .91$, AVE = .59), strategic focus (3 items, $\alpha = .77$, AVE = .64), formalization (4 items, $\alpha = .76$, AVE = .55), centralization (6 items, $\alpha = .78$, AVE = .64). All AVE's exceed the suggested level of 0.50, indicating convergent validity (Fornell & Larcker, 1981). The AVE value can also be used to assess discriminant validity (Fornell & Larcker, 1981), which is evident in our results because the largest shared variance among two constructs is .45, lower than the least AVE value (.53) for any single factor. Afterwards, we also conducted sensitivity analysis by only using 3 items per construct. The alpha coefficient of each constructs still exceeded the .70 level and the AVE's were still above .5. Therefore, composites were constructed by averaging the scores of all items for each construct.

The correlation matrix regarding the main constructs is presented in Table 5.1. R&D influence and new product performance show an insignificant correlation ($r = .11$, $p > .10$). A more radical influence change has a significant positive correlation with new product performance ($r = .21$, $p < .01$). The history of changes also has a significant correlation with

new product performance ($r = .24, p < .01$). The correlation between integration and new product performance is relatively small but significant ($r = .16, p < .05$).

We explored the data for possible non-linear relationships such as an inverted U-shape relationship between radical influence changes and new product performance. However, we were not able to find any significant inverted U-shaped relationships and only a few data points where the magnitude of the radical influence change exceeded two standard deviations of the sample's overall mean. The scores of R&D's relative influence for the most recent period lie between 40 and 75 (out of 100) with an average of 58.3, which shows that R&D on average has more influence in NPD compared to marketing in our dataset covering pharmaceutical companies.

Table 5.1 Correlation Matrix

Variable Name	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	
1 NPP	3.17	0.90	1											
2 Radical Changes	1.18	0.92	.21**	1										
3 History of Changes	5.12	4.08	.24**	-.13	1									
4 Integration	3.56	0.56	.16*	-.07	-.04	1								
5 R&D Influence	58.32	18.87	.11	.02	.15	-.19*	1							
6 Resources	35.21	6.15	.71***	-.04	-.10	.09	-.01	1						
7 Strategic Focus	2.92	1.23	.13	.06	-.09	-.06	.05	.08	1					
8 Formalization	2.75	0.71	.03	-.07	.10	-.14	.01	-.07	.25***	1				
9 Centralization	2.87	0.64	.14	.10	.08	.16	.07	.13	.01	.37**	1			
10 US HQ	0.36	0.48	.33***	-.14	-.07	.12	.06	.17*	.02	.17*	.07	1		
11 Japan HQ	0.13	0.34	-.01	.03	-.06	-.06	.12	-.21*	-.04	-.13	-.08	-.29***	1	
12 European HQ	0.51	0.50	-.31***	.11	.11	-.08	-.13	-.02	.01	-.08	-.02	-.77***	-.39***	1

* Significant at $p < .05$ (two-sided)

** Significant at $p < .01$ (two-sided)

*** Significant at $p < .001$ (two-sided)

5.4.2. Hypotheses testing

We devised incrementally more comprehensive regression models and estimate the nested models using the Ordinary Least Square (OLS) method. Because of potential multicollinearity between the interactions and its component variables, we mean-centered the variables nested in the interaction (Jaccard, Wan & Turissi, 1990). Table 5.2 shows the results of the regressions.

Our models explain up to 69 percent of variance in new product performance. The VIF values are below 2, indicating that multicollinearity is not a major concern in our analysis. Although we can only use Model 3 to test our hypotheses (the other models are incomplete), the nested models provide interesting insights in the underlying relationships. In all models, the radical change variable obtains a positive and significant coefficient ranging from $\beta = .21, p < .01$ to $\beta = .14, p < .05$. Therefore, we find support for H1.

Moving on to the next hypothesis (H2), the results show that the effect of radical influence changes on new product performance is stronger when the organization has a richer history of relative influence changes. The coefficient of the interaction between the two variables is positive and significant in all models ($\beta = .13, p < .05$). The relationship is visualized in Figure 1. Separate relationships are plotted for organizations with a different history of relative influence changes (based on a median-split). One group of organizations ($n = 53$) has a relatively rich history of changes and one group ($n = 53$) has a more stable history of changes. The Figure shows that radical influence changes produce most new product performance for companies with a rich history of changes (steeper slope). H2 is supported.

Table 5.2 The determinants of New Product Performance

Variable	Model 1		Model 2		Model 3	
	beta	VIF	Beta	VIF	beta	VIF
<i>Marketing/R&D Interface</i>						
Radical Changes (RC)	.21 **	1.09	.14 *	1.12	.14 *	1.31
R&D Influence	.08	1.36	.08	1.45	.09	1.49
History of Changes (HC)	.14 *	1.24	.13 *	1.25	.13 *	1.42
Integration (INT)	.17 **	1.22	.17 **	1.89	.14 *	1.92
<i>Org. Characteristics (Controls)</i>						
Resources	.70 **	1.72	.70 **	1.75	.70 **	1.77
Formalization	.09	1.28	.09	1.30	.08	1.31
Centralization	-.03	1.31	-.04	1.36	-.05	1.38
Strategic Focus	.17 **	1.68	.16 **	1.75	.16 **	1.76
US HQ	.23 **	1.27	.22 **	1.28	.23 **	1.29
Japan HQ	.22 **	1.14	.22 **	1.18	.24 **	1.19
<i>2-way</i>						
HC*INT			.03	1.74	.03	1.84
RC*INT			-.05	1.21	-.04	1.34
HC*RC			.13 *	1.20	.13 *	1.31
<i>3-way</i>						
INT*RC*HC					.12 *	1.42
N	106		106		106	
R ²	.65		.67		.69	
Adjusted R ²	.63		.64		.66	
F-value	29.68 **		22.48 **		18.80 **	

* Significant at $p < .05$ (two-sided)
 ** Significant at $p < .01$ (two-sided)
 *** Significant at $p < .001$ (two-sided)

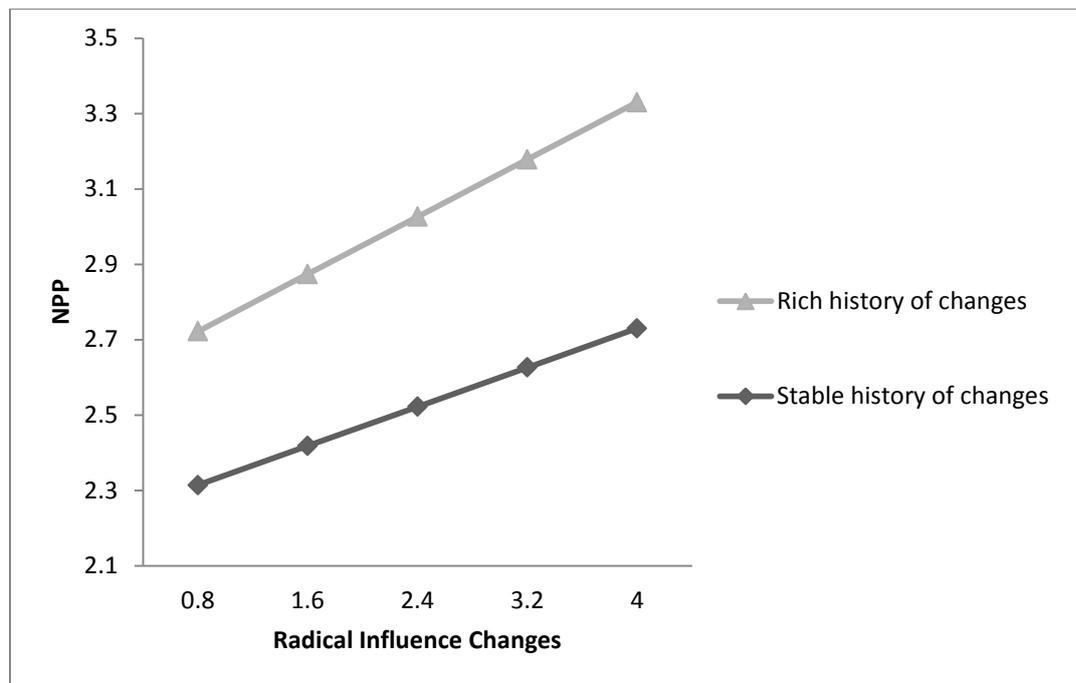


Figure 5.1. The relationship between more radical influence changes and new product performance under different ‘history of influence change’ conditions

On Figure 5.1, we also observe a main effect from having a richer history of changes (the slope is not only steeper but new product performance is higher across the board for companies with a rich history of changes). Even though we did not hypothesize this particular relationship, our result seems to support Davis and Eisenhardt (2011) arguments that the practice of reconfiguration of power has a positive effect on performance in general.

The third hypothesis describes the most comprehensive relationship and is concerned with the effect of radical influence changes, considering the moderation of the history of changes and the level of integration between marketing and R&D. The full model shows that the interaction between radical changes and the history of changes is still significant ($\beta = .13, p < .05$). In addition, the three-way interaction between radical change, the history of changes and integration is positive and significant after controlling for the main effects and the two-way interactions that are nested ($\beta = .12, p < .05$). To visualize this interaction, we first divide the sample using a median-split on the degree to which the organization had a rich

or stable history of changes and second whether the organization has a high or low level of integration between marketing and R&D.

Figure 5.2 and Figure 5.3 visualize the moderating effects of integration for different types of organizations. Interestingly and as hypothesized, companies that score high on integration do not necessarily outperform companies with low integration if these companies have a stable history of relative influence changes. However, the positive moderation effect is visible for companies with a rich history of influence changes. Based on the significant three-way interaction in the full model and the exploratory visualizations of the nature of the interaction, we find support for H3.

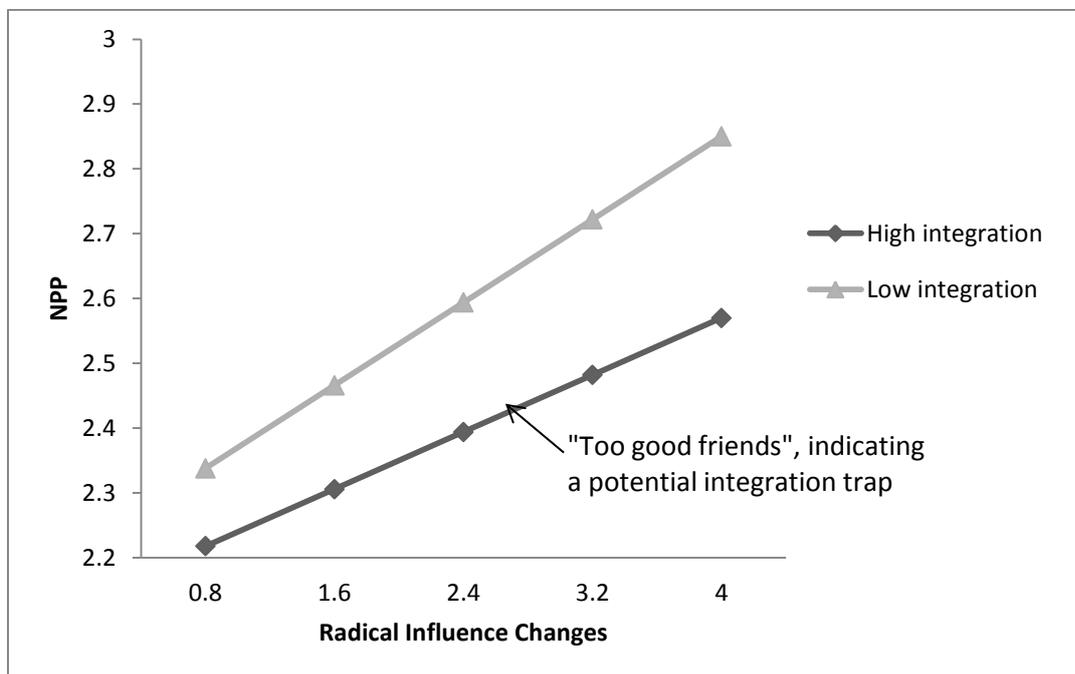


Figure 5.2. The relationship between more radical influence changes and new product performance (NPP) for companies with a stable history in terms of influence changes (n=53) under different integration levels.

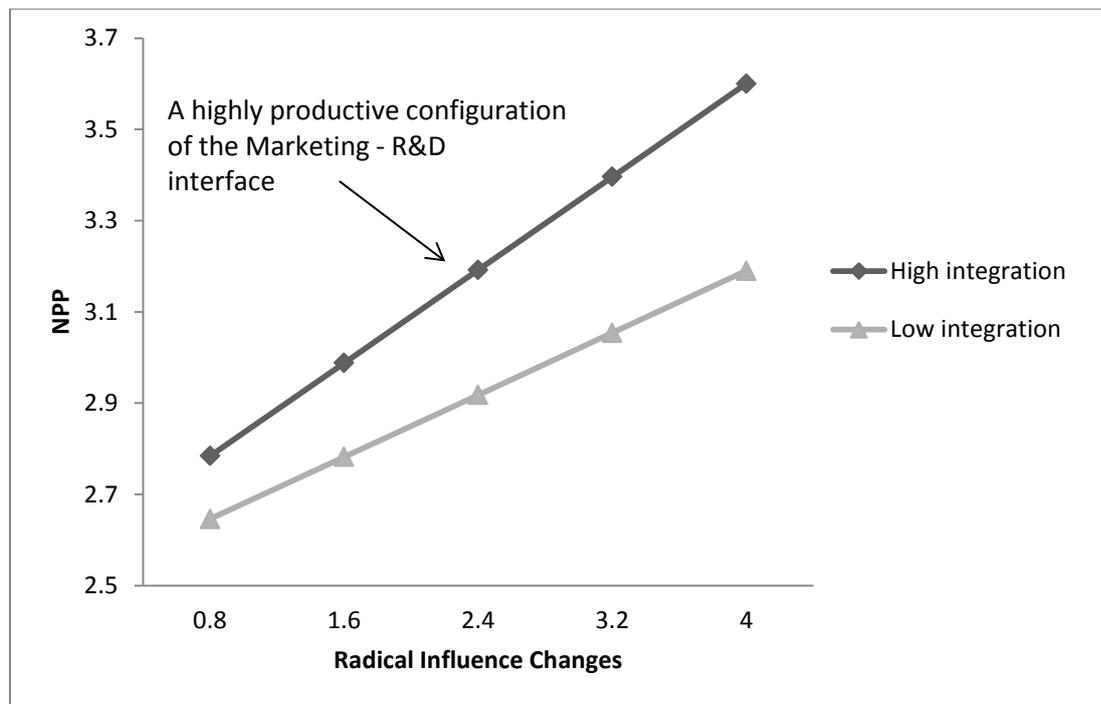


Figure 5.3. The relationship between more radical influence changes and new product performance (NPP) for companies with a rich history in terms of influence changes (n=53) under different integration levels.

5.4.3. Robustness tests

In addition to our proposed metric of more radical influence changes, we also tested two alternative measures. The first alternative has a longer time horizon compared to equation 1. In this measure, we count the number of occasions where relative influence changes exceed a certain cut-off point. First, we define the indicator function and set the cut-off point to 10 (remember we have a constant sum scale between 0 and 100, which means that a decrease of one area's influence of 10 points results in a shift of 20 points), which is likely to be quite radical. We define the indicator function:

$$1_A : |\Delta RC_j| \rightarrow \{0,1\}$$

$$1_A(|\Delta RC_j|) = \begin{cases} 1 & |\Delta RC_j| \geq 10 \\ 0 & |\Delta RC_j| < 10 \end{cases} \quad (3)$$

The output of indicator function 1_A can be either 0 or 1. The output of the function is equal to 1 if the input is larger or equal to 10, or 0 otherwise. We measure radical change ($RC1_j$) of company j by counting the number of periods where the relative influence change exceeds the cut-off point of the indicator function.

The second alternative is to calculate the extent to which the current change of the level of relative influences in the organization is radical compared to the sample's average.

$$RC2_j = \frac{|RI_{j,t=1} - RI_{j,t=0}|}{SAC} \quad (4)$$

SAC = Sample average influence change (i.e. the sum of all the changes or relative influence of all companies in the sample between period $t-1$ and $t0$, divided by the number of companies in the sample).

Table 5.3 Tests for alternative operationalization of Radical Change

Variable	Model 3 with Alternative 1 (<i>RCI</i>)		Model 3 with Alternative 2 (<i>RC2</i>)	
	beta	VIF	beta	VIF
<i>Marketing/R&D Interface</i>				
Radical Changes (RC)	.14 *	1.74	.10 †	1.92
R&D Influence	.09	1.39	.04	1.40
History of Changes (HC)	.11 †	1.41	.18 **	1.50
Integration (INT)	.11 *	1.90	.15 *	1.94
<i>Org. Characteristics (Controls)</i>				
Resources	.69 ***	1.76	.70 ***	1.77
Formalization	.08	1.32	.07	1.31
Centralization	-.01	1.33	-.03	1.37
Strategic Focus	.10 †	1.76	.25 **	1.81
US HQ	.21 **	1.29	.21 **	1.28
Japan HQ	.27 **	1.19	.25 **	1.18
<i>2-way</i>				
HC*INT	.02	1.60	.03	1.22
RC*INT	-.03	1.26	-.02	1.11
HC*RC	.13 *	1.76	.13 *	1.81
<i>3-way</i>				
INT* RC *HC	.11 †	2.11	.12 *	1.84
N	106		106	
R ²	.66		.68	
Adjusted R ²	.63		.65	
F-value	17.3 ***		18.1 ***	

† Significant at $p < .10$ (two-sided)
 * Significant at $p < .05$ (two-sided)
 ** Significant at $p < .01$ (two-sided)
 *** Significant at $p < .001$ (two-sided)

We estimated model 3 (full model) from Table 5.2 using the two alternative measures for more radical changes and the results are provided in Table 5.3. The results show that the model with our original metric and the model with the two alternatives do not differ substantially. The VIF values are similar and the coefficients of the three way interaction between the history of influence changes, radical changes and integration are very similar (*RCI*: beta = .11, $p < .1$; *RC2*: beta = .12, $p < .05$; versus the original *RC*: beta = .12, $p < .05$).

Similar relationships also occur when the interaction is visualized in plots. Overall we find support for the robustness of our measure.

We also collected factual data on the new product performance of the companies in the sample ($n = 57$). A correlation analysis between NPP and the sales from products less than 5 years on the market is high ($r = .59, p < .001$). When we ran Model 3 again with this factual indicator as the dependent variable, the results were again quite similar ($\beta = .14, p < .1$). Overall, it seems reasonable to claim that our subjective NPP measure reflects factual new product performance of the company and that the results across different measures are quite similar.

In addition, a pooling test on all constructs of the model revealed no significant differences between respondents with a senior marketing background (61%) and respondents with a senior R&D background (39%) and similar results occurred when only senior marketing respondents were used in the analysis.

5.5. Discussion

Earlier research has paid a lot of attention to cooperation, communication and integration in the marketing – R&D interface in relationship to new product performance (Griffin & Hauser, 1996, Gemser & Leenders 2011). This study is an attempt to further open the black box of the marketing – R&D interface and to go beyond what is normally described as integration. In particular, we focus on the balance of influence between marketing and R&D and, more importantly, how this balance changes over time and what the effects are in terms of new product success.

On a stand-alone basis, we found that radical influence changes are generally beneficial for new product performance. However, there are certain conditions that make this effect more pronounced. In particular, a rich history of changes together with a high level of integration between marketing and R&D is the most symbiotic interface configuration that produces the highest performance of new products.

This paper also offers a new way to interpret the mixed results of integration that have been found and reviewed in meta-studies (c.f. Henard & Szymanski, 2001, Troy, Hirunyawipada & Paswan, 2008). Our study suggests that one should expect mixed results if one do not take into full account that integration is only one aspect of the relationship between marketing and R&D. Integration, or other cooperative constructs, is likely to be a moderator on other relationships (Troy, Hirunyawipada & Paswan, 2008). Specifically, we found different effects of integration in companies with a rich history of relative influence changes versus companies with a stable history of relative influence changes. For companies with a stable history of relative influence changes, a high level of integration may be detrimental for the productivity and signaling the 'too good friends syndrome' (Souder 1980, 1988). This finding suggests that there is an 'integration trap' and that the benefits of integration may be lessened by the underlying stability in the organization in general, and in particular, by the stability of its relative influence structure. In such circumstances, stronger integration could easily lead to both departments looking for areas of agreement and a disinclination to 'rock the boat' leading to less experimentation and more inertia (Fiol & Lyles, 1985; Pfeffer, 1981; Brettel, Heinemann, Engelen & Neubauer, 2011).

Organizations that have a rich history of influence changes may have developed a 'routine to adapt and learn' (c.f. Eisenhardt & Martin, 2000; Davis & Eisenhardt, 2011; Klarner & Raisch, 2013). The results of our study demonstrate that through past series of changes, organizations are better able to handle more radical future changes. The capabilities

that may result from past changes enable the organization to more easily endeavor to depart from routines and benefit from opportunities to explore new territories (c.f. Klarner & Raisch, 2013). In order to be beneficial, there are also needs for constructive conflict (e.g., Souder 1988). So, even in the absence of integration, organizations may be capable to handle more radical changes more effectively, especially if they have a broader experience with change. If, in that situation, the organization also has a high level of integration between marketing and R&D, the practice of a more radical influence change can provide even further benefits to the organization.

The managerial implication from our study is that research managers should aim for NPD processes and internal structures that allow for regular influence changes while at the same time sustaining a high level of integration, precisely to enable the organization to benefit more optimally from more radical changes. The process of change may be a bitter pill for certain participants in the NPD process because of resistance to change. However, if they are able to experience changes while maintaining a symbiotic and trusting relationship, both marketing and R&D department have a better chance to reach the shared goal of achieving superior new product performance.

Our study has a number of limitations. First, we based our analysis to a large extent on self-reported data. This type of data might be prone to certain types of biases such as memory, managerial background, expertise, time pressures, etc. Although we paid quite some attention to measurement validation, future research may complement our findings by using additional scales (e.g., for new product performance efficiency for example) and different types of data. Second, although not uncommon, we asked informants to look back in time and score past relative influence balances in different period. Ideally, future research should try to measure relative influence as it progresses in time. Third, research on relative influence is still in an early stage and fewer measurement scales are available compared to, for example,

integration. In this study we assess relative influence in multi-year time intervals and more detailed measures covering more functional areas may provide additional insights. Fourth, as we do not have detailed panel data on the changes in relative influence that occur in the company, we cannot conduct panel data analysis regarding company-specific effects. Fifth, there could also be a concern for industry specific biases because our data is gathered from a single industry. However, the pharmaceutical industry is a typical example of a highly innovative and technology driven industry. Further studies, especially also of industries that focus on non-technological innovations, are necessary to find out whether our results are fully generalizable.

Appendix 5.A. The list questions used for the latent constructs used in this study

New product performance

The performance of the products that have been launched in the last five years
The number of new products in the last five years
The number of breakthroughs in the last five years
The quality of the R&D pipeline in the last five years

Integration of R&D with marketing

A friendly attitude exists between R&D and marketing
Open communication of relevant information occurs between R&D and marketing
R&D and marketing intentionally provide each other with misleading information
R&D and marketing search for solutions that are agreeable to each other
R&D and marketing are more like teammates than competitors
If disagreements arise between them, R&D and marketing are usually able to resolve the disagreements
R&D and marketing openly share their ideas with each other
R&D and marketing help each other to more effectively perform their tasks
R&D and marketing often fail to communicate information to each other (Reverse)
R&D and marketing are always blaming each other for failures (R)
It is difficult for R&D and marketing to contact each other (R)
Conflicts between R&D and marketing are of a constructive kind
R&D and marketing perceive their problems as mutual problems
R&D and marketing recognize each other's talents and expertise
R&D and marketing share resources to complete tasks

NPD Resources

The sophistication of R&D equipment
Goodwill at medical institutes
Database and library facilities
Contacts with universities
Worldwide market information
Top scientists
Contacts with top medical specialists
Cooperative R&D relationships
Relationships with governmental bodies
Knowledge of competitors

Strategic focus

Narrow product range–broad product range
Few market segments–many market segments
The number of therapeutic areas that the company is involved in with respect to marketing (e.g., cancer, antibiotics, cardiovascular)

Formalization

In my company, formal procedures are followed before making a decision
In my company, many paper forms are used
In my company, decision-making responsibilities within a job are described in detail
In my company, employees have detailed task descriptions

Centralization

My company has a flat organizational structure (R)
In my company, departments have a large degree of autonomy (R)
In my company, many decisions are taken low in the
Hierarchical structure of the organization (R)
The organization of my company is very centralized
Making decisions in my company is strongly bound to hierarchical lines
In my company, most decisions have to be approved by higher management

6. Conclusion

The main aim of the thesis is to explore – and to bring into prominence – the impact of evaluatory signal variability, market performance variability, and leadership variability in the NPD process on organizational strategy, performance, and stakeholder attitudes and behaviors. This final chapter synthesizes the findings of the four studies. Firstly, major findings are summarized. Following this, a discussion to explain the implications of the findings to the main theoretical themes is presented. Next, implications to managerial practices are clarified and finally, several suggestions for further research are given.

6.1. Major findings

Chapter 2 focuses on the determinants of market performance of sequels. Included here is confirmation of the findings of previous studies by showing the forward carry over effect of evaluatory signals and market performance of past editions on the sales of sequels (Hennig-Thurau et al., 2009). What is new in this study is that the variability of evaluations across previous editions in the series moderates the carry over effect, both in the context of consumer evaluations and expert evaluations. In addition, several other moderating factors were identified as to the effect of consumer evaluations of past editions, namely: the sales performance of the past editions and the type of social interaction during product consumption. Both of these factors strengthened the effect of consumer evaluations of past editions to the sales of sequels.

Chapter 3 concentrates on exploring the determinants of consumer evaluations and expert evaluations of product sequels by examining past performance indicators and the consensus within the consumer and expert communities. Chapter 3 supports the carry-over argument in the context of product reviews. The results confirm a positive relationship

between consumer evaluations of past editions and consumer evaluations of the sequel, and between expert evaluations of past editions and expert evaluations of the sequel. The main contribution in this study is that it also illustrates that a lack of consensus among consumers can weaken the relationship between the consumer evaluations of the past editions and consumer evaluations of the sequels. This same moderating relationship is again observed in the context of expert critics. Another contribution of this study reveals that expert critics are indeed influenced by the market. Consumer behaviors (sales) of the past editions were shown to have a significant and positive effect to expert evaluations of sequels.

Shifting the attention towards the company itself, Chapter 4 analyzes the determinants of the decisions to explore a new market segment. In this regard it is shown that the variance of sales, the variance consumer evaluations, and the variance expert evaluations have a positive effect to the probability of explorations. Results also show that positive trends of performance in terms of sales and consumer evaluations negatively affect the probability of a new genre exploration; however, a positive trend of expert evaluations has a negative effect. This finding signifies how different performance indicators can have contradictory effects to management decisions.

Chapter 5 looks deeper into the internal environment of the organization by exploring the effects of changes in the level of relative influence of marketing and R&D departments during an NPD process. The results indicate that companies that have a rich history of changes, or high variability, in terms of marketing and R&D influence level are able to perform better than companies that experience fewer changes. This effect is especially beneficial for companies that also have a high degree of integration between the two departments, while a high level of integration that is coupled with fewer changes can lead into a much lower level of performance.

6.2. Implications to the main theoretical themes

The first major theme in this study is the effects of evaluatory signals. The basic assumption in the literature is that the ideas and the impressions connected to the earlier editions are transferred to the next edition (Keller 2003; Sunde & Brodie, 1993). Past consumer evaluation (Hennig-Thurau et al., 2009) or quality assessment (Völckner & Sattler, 2006) have been shown to have a positive effect on future performance. This concept is confirmed by showing how evaluation of past editions can positively affect sequel sales (Chapter 2), sequel evaluations (Chapter 3), and new segment explorations (Chapter 4).

What has been overlooked by prior studies is the effect of variability of evaluations explored in this thesis. Variability of evaluation can create an ambiguous or an uncertain product image in the eyes of potential buyers (Das & Chen, 2006) and it was demonstrated in Chapters 2 and 3 that the ambiguity of these signals negatively affects future performance. The observed direct effects of variability of evaluations strengthen the arguments of Das and Chen (2006) about how the variability of opinions affects product performance. In addition, variability is especially damaging for high performing products because it can mitigate the carry over effect of other performance indicators. Considering the significant role of evaluations variability, both as a determinant of performance and as a moderating factor, future research should consider using variability as an alternative when discussing the impact of product reviews on the performance of (creative and cultural) products.

In Chapter 4, it is shown that besides affecting stakeholder behaviors and attitudes, evaluatory signals and the variability of these signals across time can also influence management decisions. The implications of this finding are two-fold. Firstly, with regard to the main topic, it explains how variability of evaluatory signals can have a strong effect not only to consumers or expert critic behaviors, but also to the organization itself. This result is

new for the exploration and exploitation literature because when discussing performance, it is often defined as market performance or sales, not as product evaluations (see Raisch & Birkinshaw, 2008). Secondly, by providing evidence about the effects of evaluatory signals on organization strategy, the research signifies that the impact of product evaluations is stronger than previously acknowledged by the literature, which so far limit the test of the impact of evaluatory signals on sales or consumer behavior (c.f. Basuroy, Chatterjee, & Ravid, 2003; Boatwright, Basuroy, & Kamakura, 2007; Eliashberg & Shugan, 1997; Liu, 2006; Reddy, Swaminathan, & Motley 1998; Sun, 2012; Zhu & Zhang, 2010). With the digitization of information, the ever increasing number of mobile devices and connected users, and the relative ease to submit (or blog, post, and tweet) product evaluations and opinions online, it is not surprising that online consumer opinions influence how organizations operate. An example from the industry is worth noting. Electronic Arts was forced to redevelop their product and publish free contents because of the overwhelmingly negative consumer evaluations. The product itself had minimal technical errors and received critical acclaim. Future research about exploration and exploitation, innovation, or discussions about organization strategy in general should be strongly encouraged as should consideration of the impact of consumer evaluations and the fluctuation and dispersion of consumer evaluations –in addition to market performance as a determinant of strategy.

An additional find in conducting the study is that expert critics are affected not only by their own evaluations of the past editions, but also by consumer evaluations and sales of past editions. Chapter 3 shows that the market performance - in a sense, the visible hand of the market - can actually influence expert opinions, particularly when the experts have a low level of consensus. This finding opens up a new perspective for the literature about the relationships between signals and performance. It is also a counterintuitive result, because expert critics are considered "professionals" that possess a high level of credibility to assess

products "objectively" and "independently" without being affected by signals originating from others, particularly, the market.

Even though the results suggest that expert critics are influenced by the market, it seems that companies still have high regard for critics' acclaim. Chapter 4 shows that organizations seemed to react to a positive trend in expert critic evaluations as a momentum to expand their operation and explore new market segments, instead of viewing critical acclaim as a reason to keep on doing the same, as for instance, in March's (1991) argument that performance is negatively related to the likelihood of exploratory behavior. This paper argues that expert opinions are more about how these experts judge the capabilities of the organization as evidenced by the products that have been produced by the firm. Therefore, its potential implication is not limited to the submarket to which these products belong. Critical acclaims could be considered to give the producer the reputational capital that can be transferred to other submarkets, while sales and consumer evaluations are more about how well the products satisfy consumer preferences in the context of a submarket. Therefore, based on the results in this thesis, one can argue that Singh's (1986) and March's (1996) arguments may be limited to only specific type of performance and future research might want to consider both March's (1996) theory and the threat rigidity thesis (Staw et al. 1981) when discussing organization risk taking behavior. These results open up various new avenues for research. To start with, it could be of great interest to further explore the effects of different kinds of past performance - and of different performance metrics - on strategic decisions.

The second theme of this thesis is the feedback effects of market performance. Chapters 2 and 3 confirm that sales performance of past products has a positive impact on the sales and evaluations of sequels (c.f. Hennig-Thurau et al., 2009; Keller, 1993). Also Chapter 4 confirms March's (1991) argument relating to the negative relationship between

satisfactory performance and risk taking (explorative) behaviors. Chapter 5 reconfirms that the availability of resources, which is more likely after good past sales performance, leads to a more successful new product performance (c.f. Leenders & Wierenga, 2008).

In addition to the confirmation of previous research, this endeavor makes several contributions for this theme. First of all, Chapter 4 demonstrates the relationship between the variability of market performance and risk taking behaviors. It shows that if sales performance is increasing, companies avoid seeking entrance to a new market segment. On the contrary, when there was a high level of variance in the market performance of their products, organizations are more willing to expand to a new market segment. The study in Chapter 4 signifies that in order to study the effects of past performance on future behavior, one has to take full account of the variability - and a trend is a particular form of variability over time - of market performance.

Secondly, another role of market performance is demonstrated herein, namely as a “weighing factor” with respect to the relationship between past evaluatory signals and sales of future products. Chapter 2 explores an interaction between sales performance and evaluatory signals, an advance on previous studies that looked at past quality evaluation and past performance, which operationalize these constructs as independent non-interacting factors (c.f. Dacin & Smith, 1994; Hennig-Thurau et al., 2009; Keller, 1993; Volckner & Sattler, 2006). The adoption of the Theory of Reasoned Action in the discussion of product sequels is unique and as far as is known, this study is the first to do so. The adoption of this theory provides the theoretical basis to operate past sales as a weighing factor. However, it is not known for certain how market performance influences individual opinion. Further studies should deepen the understanding of such interacting processes and also the impact of other possible weighing factors. One concrete possibility would be to track individual reviewers across product, across time and observe how sales and the size of user community influence

the ways these individual reviewers weigh information from the community and use this information in their individual opinions.

The last theme of this thesis is about how the variability of leadership in an NPD process can lead to better performance. In Chapter 5 it shows how a rich history of changes in terms of the level of influence of marketing and R&D has a positive effect to the organization. Also, it appears that a rich history of changes coupled with a high level of integration is the best configuration for organizations. The capability to change indicates an organization's flexibility and if it is also able to maintain a high level of integration, means that the organization is able to absorb knowledge from marketing and R&D while also maintaining a good relationship between the two. However, without changes, integration is devalued because both parties tend to avoid conflicts and be unable to challenge the dominant view in their relationship. These results help to explain the weak relationship between integration and performance (Henard & Szymanski, 2001; Troy, Hirunyawipada & Paswan, 2008) by framing it as a moderator of changes rather than a stand-alone factor. This study limited itself to the variability of the balance of power across the marketing/R&D interface. The effects of such variability could also be explored with respect to other types of power relations within the organization, like the synergy between dual leaders in an organization led by two hierarchically equivalent executives (c.f. Bhansing, 2012) or changes in the balance of power between top and middle management.

Finally, the link between changes of relative influence and the previous themes can be highlighted. The first and second themes concern the stakeholders, their behaviors and attitudes, and the factors that help to determine product sales (Chapter 2) and evaluations (Chapter 3) are investigated, followed by the exploration of how sales and evaluations can motivate the organizations to take certain strategic choices (Chapter 4). In Chapter 5, the continuation of this line of thinking shows how the changes of relative influence during an

NPD process positively affect new product performance. One of the reasons for these changes is the decline or instability of performance (c.f. Chapter 4). A crisis can shift organization focus more towards refining its marketing strategy and developing marketing innovation capabilities (Naidoo, 2010). The discussion and results from Chapter 4 and Chapter 5 indirectly suggest that the variability of performance is a condition that can encourage the organizations to “rock the boat” (Souder 1980, 1988). Although this is not tested directly, the research here argues that the variability of market performance and evaluatory signals are necessary conditions which lead organizations to take risk, to conduct experimentation, and to make changes, which would lead the organization to a broader perspective which is positively linked to performance. This contrasts with the view - widely present in the literature on management, marketing, and finance- which considers instability or decline of performance solely as a negative phenomenon. Further studies might also pay attention to the effects of instability and decline in other indicators of performance, like the effects of decline in the satisfaction of the employees.

6.3. Implication for managers

The findings also have important implications to managerial practice. First of all, marketing managers can use variability to better predict the attitude of their consumers and how the experts view their products. The analysis results in Chapter 3 on the determinants of evaluations demonstrate how the lack of consensus within consumer or expert communities can significantly weaken the effect of their past evaluation on the evaluation of the next edition. Chapter 2 illustrates how variability can weaken the effect of consumer evaluations and expert evaluations of past editions on sales. This implies that products with mediocre or low review scores can perform better when the variability of the reviews is high. However,

managers with more positive review should be more cautious when they observe variability in their product evaluations as the link of past evaluation to sequel evaluation and sales are weakened. Market analysts, consultancy companies, and even investors can use this model to estimate future market conditions. They can use it to predict the performance of product extensions and assess whether they should invest (or advise their clients to invest) in such ventures.

The study on explorative behavior (Chapter 4) is also beneficial for managers in predicting competitors' strategies. The model herein is based on performance data that is easily adopted in various industrial settings and is most of the time easily accessible by any organization. When managers can better predict the actions of their competitors, they will also be able to design strategies to counter such actions. Market analysts can use the model to predict the popularity of a particular market segment in the future and assess whether an entry or an exit from the segment by a specific organization is likely to occur. Likewise, investors can also use this model to identify popular segments which might lead to higher investment costs and better structure their investment portfolio.

The last study (Chapter 5) is especially important for managerial practice during the NPD process. It is understandable that a loss of influence might be an uncomfortable situation for the losing party. However, if one looks at NPD as a collaborative process, changes of influence can lead the organization to better performance. These findings encourage management policy that supports rotating leadership structure in organizations. Although it is important to note that the collaborators should maintain a high level of trust and cooperation during the process.

6.4. Limitations and future research

Already a number of limitations and suggestions for future research have been made in the discussion of the main themes. This final section briefly indicates other of areas of future research based on the results, where this researcher hopes to contribute in the near future. First of all, evaluation scores are used in the analysis instead of the evaluation texts. The evaluation texts might likely possess richer information such as the choice of words, emotions, and more subtle messages, among other things, that may not be observed by merely looking at the score. Collaborative studies that combine knowledge from linguistic and business study might be a venue for future research. Linguistic are useful to measure and transform the evaluation texts into a quantified format.

Second, this research is limited to predicting behavior and attitude of consumers and experts towards sequels. Instead of predicting behavior and attitude across editions, a future study that links evaluations of one product across time might also yield useful insight. This research can test how sentiment towards a product can be transferred across evaluators from the same group and also influence the evaluation of other group. The research can also be a combination of the models provided in Chapter 2 and Chapter 3 that forms an integrated model that is able to observe how evaluation scores evolve across time, affecting performance, and how the performance would then affect future evaluations. Such research might also adopt the approach to look at the evaluation texts rather than scores to better see how consumer and expert attitude evolve across time, and how ideas about the product are spread among consumers and experts.

Third, when discussing the theoretical implications, it is mentioned that the studies in this thesis only look at the effects of supposed interaction between individual consumers and experts, while the interactions remain in a “black box.” This decision is defended by arguing

that such an approach would be very difficult to manage as it would involve the necessity of direct observation of the behavior and attitude of each consumer and expert and follow them across time. Future research can look deeper into how the carryover mechanism actually occurs in the communities of consumers and experts. In light of the popularity of blogs, tweets, and the proliferation of sharing personal activities online, it could be much easier to observe individual attitudes and behavior. Future research would benefit from web crawling techniques and data mining procedures to construct and analyze large- scale databases about consumers and experts linked to product performance.

Fourth, the gap between Chapter 4 and Chapter 5 manifests the lack of an integrated model that tests how changes of performance affect strategy, and how the changes of strategy would in turn change performance. So far these changes are tested in separate studies here because the industrial settings in these two studies are different. It is recommended that a future study that be focused on developing an integrated model that directly links and tests the two phenomena. One example of a research idea is a study on the effect of consumer reviews to organization strategy to release free and premium product upgrades. This research could explore if negative reviews can force organizational strategy to release free contents to recover unsatisfied consumers, while positive reviews signal a satisfied market that can be exploited even more through premium product upgrades. The same research could also explore how these free and premium upgrades influence subsequent reviews. Such research would fit into the service recovery literature or product innovation literature.

Finally, as a byproduct of search for data on computer games, the team collected a database of video games producers, employees, sales, and evaluations in the form of scores and texts. There are enormous possibilities for using these large datasets for business studies. For example, one can explore the effect of performance in terms of product sales and evaluations to the career of individual programmers, designers, and managers. The movement

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of employees could be tracked across different video game development projects, observing the effect of their movement and the network between the performances of those projects. An analysis of how the networks of collaborations between developers affect their individual performance, the type of product they make, and their strategy in targeting market segments is another among the many possibilities that lie ahead. This study demonstrates one step in this variation universe of possibilities.

English Summary

Why variability is such an important variable to discuss in management research? My fascination towards our relative ignorance to variability went a way back before my PhD years. When I was a little bit younger, I went to an IT school and there I studied to become an engineer and I learnt that R&D department or engineers has a very important role in organization. They are the champions of technology, they are the inventors of technology that can help to improve not only the performance of the company they work for, but also the quality of life in the society. Not long after I graduated from the IT school, I went to a business school in Groningen. But there my professors lamented why in many industries, the marketing department is losing grounds to other departments. They suggested that organizations should focus their attention towards the consumers, give more power to marketing department, because only then the organizations are able to recognize consumer demands and cater for them – they believe that the decline in marketing department power is very serious issue so they wrote a paper about this, published in the Journal of Marketing. When I read their paper, the engineer part of me believed that my IT professors are right, but the social scientist part of me believed that my professors in Groningen are right.

When I started my PhD, my supervisors asked me to finish an old project about the impact of marketing and R&D relative influence to new product performance. During this project I learnt that actually organizations performance is positively affected by the continuous shifts in the level of relative influence of marketing and R&D. Only then organizations are able to benefit from the knowledge and expertise of these two departments. At the end of my first research project, I started to question my perspective; perhaps our current approach in management science is not completely right. Instead of focusing on chronic dispositions, we should explore the impact of diversity. Perhaps instead of focusing on finding out the most powerful department, we should focus on the exchanges of power.

Instead of the most dominant view or opinion, we should look at a fuller overview and explore if the opinion is shared among all individuals. After all, “Variability is the law of life, and as no two faces are the same, no two bodies are alike, and no two individuals react alike and behave alike,” our current approach in management research might be misleading. I believe that we focus too much on statistical mean and modus, but largely ignore using statistical variability and its potentials.

The overall aim of this thesis was to gain insight in the effects of variability of product evaluations, -of market performance, and -of the level of marketing/R&D power and influence towards product performance or organization strategy. Product evaluations and market performance may vary across time due to many reasons, such as different reception from users, the shifting of trends and preferences among consumers and expert critics, among many others. In addition, product evaluations may also differ across consumers and across expert critics. The variability of performance and evaluations across time and the variability across evaluators have important implications to the organization, which has been largely overlooked prior to this thesis. Considering that the conditions outside the organization are continuously changing, it is also necessary for an organization to change. I explored the best organizational set up that enables organization to benefit from changes. The empirical setting of this thesis was the console video games industry and the pharmaceuticals industry.

Chapter 2 focused on the determinants of market performance of sequels. In this study we were able to confirm the findings of previous studies by showing the forward carry over effect of evaluatory signals and market performance of past editions on the sales of sequels. What is new in our study is that we were able to show that the variability of evaluations across previous editions in the series moderates the carry over effect, both in the context of consumer evaluations and expert evaluations. In addition, we were able to identify several other moderating factors to the effect of consumer evaluations of past editions, namely: the

sales performance of the past editions and the type of social interaction during product consumption. Both of these factors strengthened the effect of consumer evaluations of past editions to the sales of sequels.

Chapter 3 focused on exploring the determinants of consumer evaluations and expert evaluations of product sequels by focusing on past performance indicators and the consensus within consumer community and within expert community. Different from Chapter 2 which was focused on the determinants of sales; in Chapter 3, we were able to support the carry-over argument in the context of product reviews. The results confirmed a positive relationship between consumer evaluations of past editions and consumer evaluations of the sequel, and between expert evaluations of past editions and expert evaluations of the sequel. Our main contribution in this study is that we are also able to show that a lack of consensus among the consumers can weaken the relationship between the consumer evaluations of the past editions and consumer evaluations of the sequels. The same moderating relationship is also observed in the context of expert critics. As a minor contribution, we showed that expert critics are also being influenced by the market. Consumer behaviors (sales) of the past editions were shown to have a significant and positive effect to expert evaluations of sequels.

Shifting the attention towards the company itself, Chapter 4 focused on the determinants of the decisions to explore a new market segment. We were able to show that the variance of sales, the variance consumer evaluations, and the variance expert evaluations have a positive effect to the probability of explorations. Our results also showed that positive trends of performance in terms of sales and consumer evaluations negatively affect the probability of a new genre exploration; however, a positive trend of expert evaluations has a negative effect. This finding signified how different performance indicators can have different effects to management decisions.

Chapter 5 looked deeper into the internal environment of the organization by exploring the effects of changes in the level of relative influence of marketing and R&D department during an NPD process. The results indicate that companies that have a rich history of changes, or high variability, in terms of marketing and R&D influence level are able to perform better than companies that experience fewer changes. We were also able to find that this effect is especially beneficial for companies that also have a high degree of integration between the two departments, while a high level of integration that is coupled with less changes can lead into a much lower level of performance.

In short conclusion, this thesis argues, provides the theoretical basis, and quantitatively explores how variability in terms of power structure, market performance, and evaluations/opinions about a product can significantly influence the performance of the product and even organization strategies. This thesis does not aim to replace the current methodology to measure market performance or power structure across departments by their mean or modus but to show how a research can explain a lot more by measuring the variability of these constructs across time and across individuals.

Nederlandse Samenvatting

Het doel van dit proefschrift was het verkrijgen van een globaal inzicht in de effecten van de variaties in productwaardering, in marktprestaties, en het niveau van invloed van de marketing en R&D afdeling. Productwaardering en marktprestatie kunnen in de loop der tijd variëren om meerdere redenen, zoals verschillen in de manier waarop gebruikers het product ontvangen, en het verschuiven van trends en voorkeuren onder consumenten en gespecialiseerde critici. De veranderlijkheid van de prestatie - en van de waarderingen in de loop der tijd en de verscheidenheid van evaluatoren - heeft belangrijke gevolgen voor organisaties. Gevolgen die voorafgaand aan dit onderzoek vaak over het hoofd werden gezien. Gegeven het feit dat de omstandigheden buiten de organisatie voortdurend veranderen, is het noodzakelijk dat een organisatie ook moet veranderen. Ik heb onderzocht hoe je het beste een organisatie zo kan inrichten dat zij optimaal profiteert van verandering. De empirische setting van dit onderzoek was de videogame console- en de farmaceutische industrie.

Hoofdstuk 2 richt zich op de determinanten van hoe de markt reageert op vervolproducten. In dit onderzoek zijn de resultaten van vorig onderzoek bevestigd door aandacht te besteden aan het carry-over effect van evaluatie signalen en de marktprestatie van vorige edities van de vervolproducten. Nieuw in deze studie is dat we laten zien dat de verscheidenheid in beoordelingen van voorgaande seriële afleveringen het carry-over effect matigt, zowel binnen de context van gebruikers- als expertwaardering. Daarbij zijn we in staat geweest verschillende andere matigende factoren van gebruikerswaarderingen van vorige uitgaven te identificeren, namelijk de marktprestaties van de vorige edities en het soort sociale interacties tijdens het productgebruik. Beide factoren versterkten het effect van de gebruikerswaardering van voorgaande uitgaven ten opzichte van verkoop van vervolproducten.

Hoofdstuk 3 richt zich op onderzoek naar de determinanten van evaluaties van vervolproducten, waarbij de nadruk ligt op indicatoren van vorige prestaties en de consensus daarover binnen de gemeenschap van gebruikers en binnen de gemeenschap van experts. Anders dan in hoofdstuk 2, waar de aandacht uitging naar de verkoopdeterminanten, zijn we in staat geweest ondersteuning te vinden voor het carry-over argument in de context van product recensies. De resultaten bevestigen een positieve relatie tussen de gebruikerswaarderingen van voorgaande en vervolgedities, en tussen de expertwaardering van voorgaande en vervolgedities. Onze belangrijkste bijdrage in dit onderzoek is dat we ook in staat zijn geweest om te laten zien dat gebrek aan eenstemmigheid onder gebruikers de relatie verzwakt tussen gebruikerswaardering van voorgaande en vervolgedities. Dezelfde verzwakking van relaties is te zien in de context van expertkritieken. Als kleine bijdrage lieten we zien dat ook expertcritici worden beïnvloed door de markt. We hebben aan getoond dat consumentengedrag (verkoop) ten aanzien van voorgaande edities een belangrijk en positief effect heeft op de expertwaardering van vervolgedities.

In hoofdstuk 4 is de aandacht gericht op de onderneming zelf en houden we ons bezig met de vraag: welke factoren zijn bepalend voor de beslissing om een nieuw marktsegment te exploreren. We lieten zien dat de verkoopvariabiliteit, de variabiliteit van consumentenwaarderingen en de variabiliteit van expertevaluaties een positief effect hebben op de waarschijnlijkheid van exploraties. Onze resultaten laten ook zien dat positieve prestatietrends in termen van verkoop en consumentenwaardering een negatieve invloed hebben op de waarschijnlijkheid van exploraties voor nieuwe genres; een positieve trend in de expertwaarderingen heeft echter een negatief effect. Deze onderzoeksresultaten laten zien hoe verschillende prestatie-indicatoren verschillende effecten kunnen hebben op managementbeslissingen.

In hoofdstuk 5 wordt dieper ingegaan op de interne omgeving van de organisatie door de effecten te onderzoeken van veranderingen op het niveau van relatieve invloed van de marketing en R&D afdeling tijdens het NPD-proces. De resultaten geven aan dat ondernemingen met een rijk verleden aan veranderingen, of een grote variabiliteit, in termen van marketing en R&D invloedsniveau in staat zijn beter te presteren dan ondernemingen die minder veranderingen hebben doorstaan. We hebben ook gevonden dat dit effect vooral gunstig is voor ondernemingen die een grote mate van integratie kennen tussen de twee afdelingen. Een hoog niveau van integratie gekoppeld aan minder verandering kan leiden tot een veel lager prestatieniveau.

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About the author

Frederik B.I. Situmeang was born on April 26, 1984 in Medan, Indonesia. In 2005, he obtained a three year bachelor degree in Informatics Engineering (Computer Science) at Del Institute of Technology. As a part of his study, he developed the academic information system and helped to design and to implement the computer network infrastructure of Nommensen University in Medan. In 2006, he was offered a scholarship to continue his education in the Netherlands. He gladly accepted the offer and chose to shift his specialization from an IT engineer to a business analyst. He went to the Rijksuniversiteit Groningen and chose Innovation Management as his specialization. In 2008, he received his first master degree with a thesis on open innovation in the IT industry. He decided to become a scholar and applied for a PhD position in the University of Amsterdam. In order to equip himself with a stronger research profile, he decided to spend one more year in Groningen to study quantitative data analysis and research methodologies as well as theories in marketing and in innovation management. He was enrolled in the Groningen's SOM research school and in 2009 he received his second master degree, this time in Marketing Research. He began his PhD in the summer of 2009 at the University of Amsterdam with a topic on "Marketing and Innovation Management in the High Tech Industries". He is currently continuing his work at UvA Business School as a lecturer and researcher in Marketing and Innovation Management.